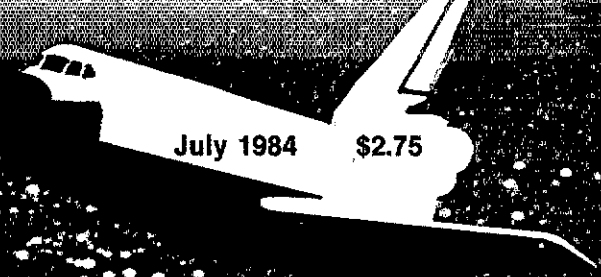


QST

July 1984

\$2.75



The ARRL National Convention
July 20-22, 1984
New York City



Henry Radio has

RF POWER FOR SALE

No, we don't sell RF by the watt but we do offer a broad line of power RF devices for many different services... communications, HF-VHF-UHF (both vacuum tube and solid state), plasma generation for sputtering, etching, laser excitation, optical emissions spectrometry, cancer research, nuclear magnetic resonance, NMR imaging, meteor burst communications and many others. Frequencies from 1.5 to 500 MHz and power levels from 10 watts to 10,000 watts. Possibly no other single company offers such a wide range of standard and special RF power amplifiers. It all started many years ago with superb amateur linear amplifiers and today as always Henry amplifiers are famous throughout the Amateur world of HF, VHF and UHF communications.

Today the range of choice is truly "mind boggling".

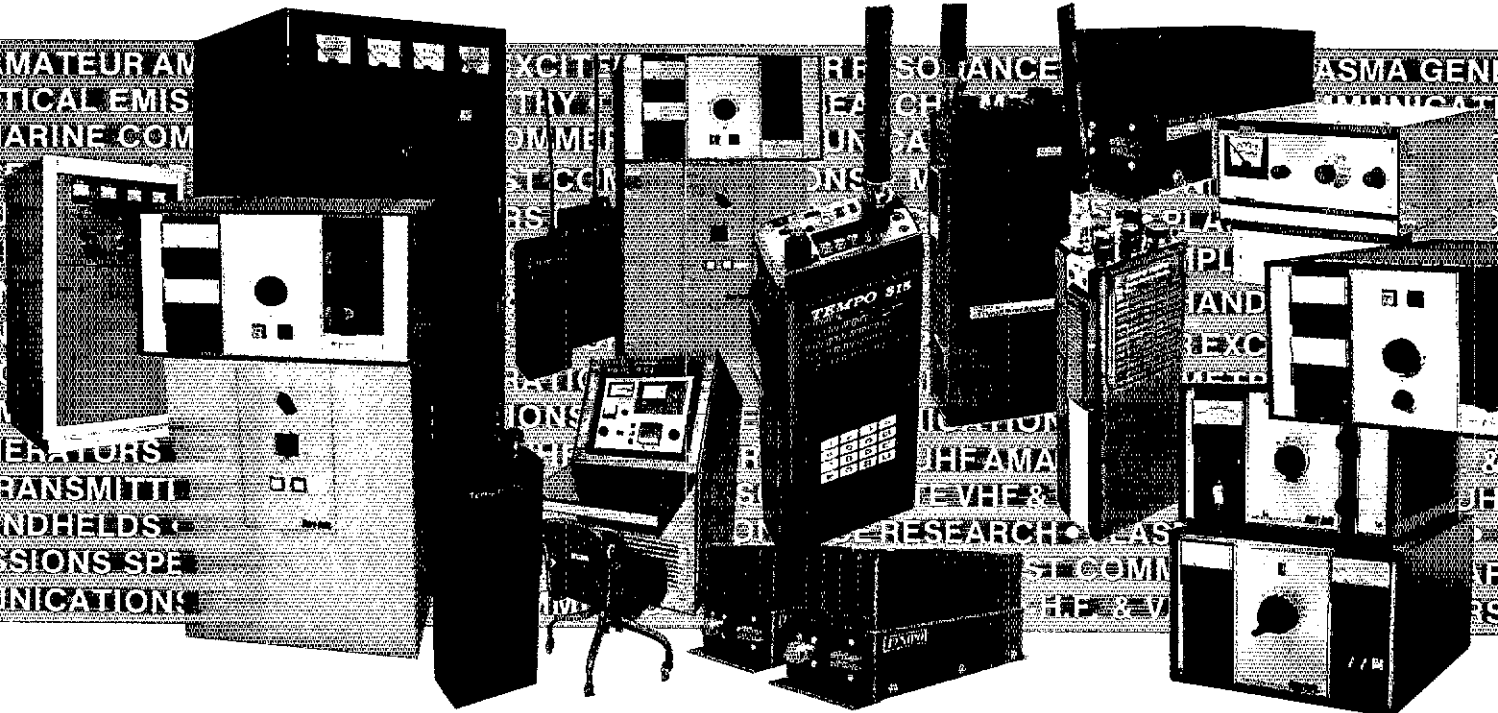
Consider these examples:

Plasma excitation for sputtering or etching... frequencies at 13.56, 27.12 or 40.68. Powers from 500 watts to 10,000 watts.

Marine communications... 5,000 and 10,000 watts HF shore or shipboard CW, RTTY, SSB for 4, 6, 8, 12, 16, 22 MHz.

Commercial two-way FM... solid state to 130 watts, frequencies from 30 MHz to 500 MHz. Vacuum tubes to 500 watts.

Nuclear magnetic resonance pulse amplifiers... powers from 500 to 10,000 watts on the resonance frequency of choice.

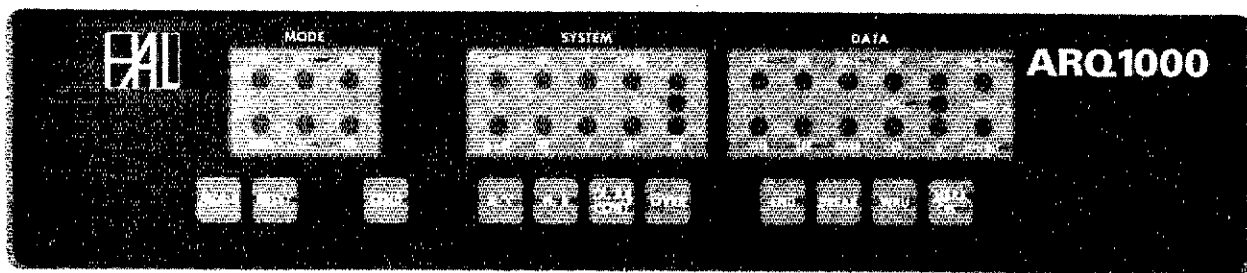


For more than half a century Henry Radio has provided the world's most diverse source of Amateur radio equipment. Now we offer the same expert personalized assistance for commercial, industrial, scientific, medical and research applications either communications or process engineering. Tell us how we can help you. Call or write Ted Henry, Ted Shannon or Mary Silva (Los Angeles office).

Henry Radio

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AMTOR RTTY

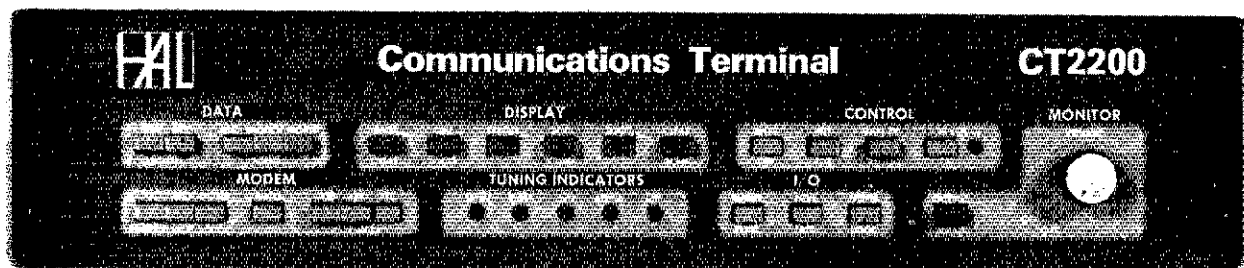


HAL is proud to announce the ARQ1000 code converter. This terminal not only supports the AMTOR amateur codes, but meets ALL of the commercial requirements of CCIR Recommendation 476-2. The ARQ1000 can be used with present and previous generation HAL RTTY products. In fact, any Baudot or ASCII full duplex terminal at data rates from 45 to 300 baud may be used with the ARQ1000. Some of the outstanding features of the ARQ1000 are:

- Send/receive error-free ARQ, FEC, and SEL-FEC modes
- Automatic listen mode for ARQ, FEC, and SEL-FEC
- Meets commercial requirements of CCIR 476-2
- By-pass mode for normal RTTY without changing cables
- Programmable ARQ access code, SEL-CAL code and WRU
- Programmable codes stored in non-volatile EEPROM
- Keyboard control of normal send/receive functions
- 30 Front panel indicators and 11 control switches
- Interfacing for loop, RS232, or TTL I/O
- "Handshaking" control for printer and keyboard or tape
- Self-contained with 120/240V, 50/60 Hz power supply
- Cabinet matches style and size of CT2200 and CT2100
- Table or rack mounting
- Built-in DM170 modem option available
- Encryption option available for commercial users
- 8½" × 17" × 10½"

The ARQ1000 is commercial-quality equipment that will give you the outstanding performance you expect from a HAL product. Write for full details and specifications of the ARQ1000.

BY POPULAR REQUEST



By popular request—the new CT2200. Our slogan is "When Our Customers Talk, We Listen"—and we have been listening. The CT2200 includes these often requested features:

- New AMTOR connections for use with ARQ1000
- Keyboard programming of all 8 "brag-tape" messages
- Programmable selective call code
- Expanded HERE IS storage for a total of 88 characters
- Non-volatile storage of HERE IS, "brag-tape," and SEL-CAL code
- 3½" × 17" × 10½"

All of the proven CT2100 features are retained. Some of these features are:

- Tuning scope outputs (a MUST for AMTOR)
- Built-in demodulator for high tones, low tones, "103", or "202" modem tones
- 36 or 72 character display lines
- 2 pages of 72 character lines or 4 pages of 36 character lines
- Split screen or full screen display
- Baudot or ASCII, 45 to 1200 baud
- Full or half duplex
- Morse code send/receive at 5 to 99 wpm
- Send/receive loop connection
- Automatic transmit/receive control (KOS)
- Audio, RS232C, or Loop I/O
- On-screen tuning and status indicators
- Clearly labeled front panel switches, not obscure keyboard key combinations
- Separate convenient lap-size keyboard
- Internal 120/240, 50/60 Hz power supply
- Attractive shielded metal cabinet

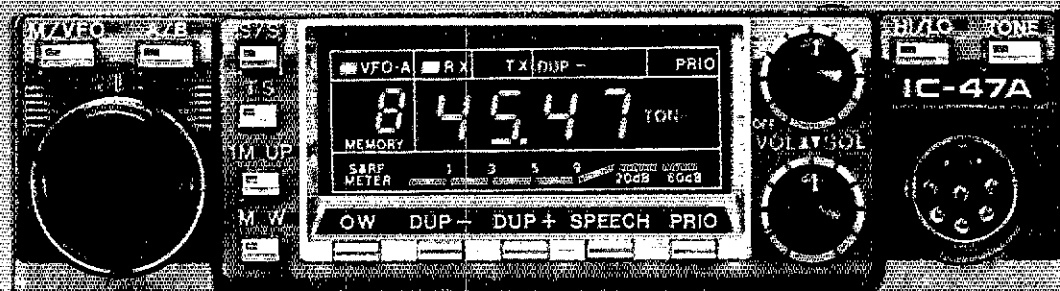
In addition, an update kit is available so that all CT2100 owners can update their CT2100's to include CT2200 features. The kit even includes a new CT2200 front panel! Rather than making a proven product obsolete, HAL put even more behind the buttons. Pick up a CT2200 at your favorite HAL dealer and join the RTTY fun. Write for our full RTTY catalog.



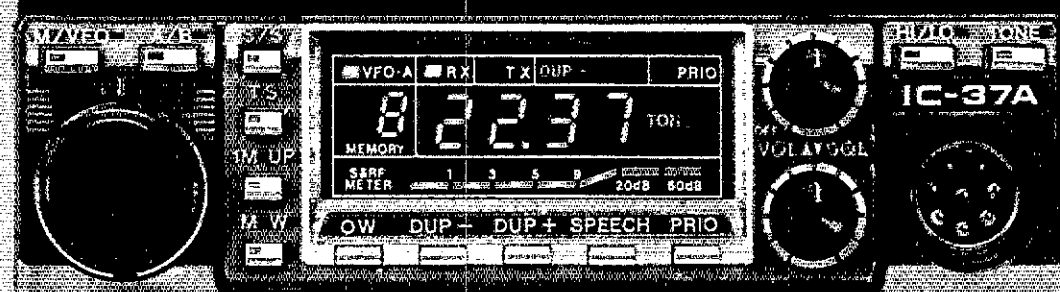
HAL COMMUNICATIONS CORP.
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ICOM Mobiles

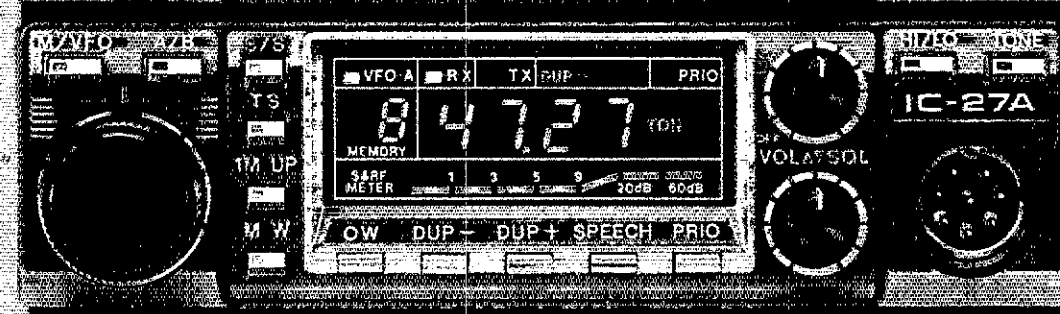
World's Most Compact Mobiles VHF/UHF/220MHz



IC-47A
440MHz
25 Watts



IC-37A
220MHz
25 Watts

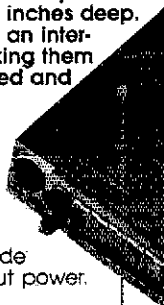


IC-27A
27Meter
25 Watts

5 1/2"

ICOM presents three ultra compact mobiles...the IC-27A 2-meter, the IC-37A 220MHz and the IC-47A 440MHz. The smallest mobiles available, the IC-27A/37A/47A series measure only 5 1/2 inches wide by 1 1/2 inches high by 7 inches deep. Yet, they contain an internal speaker making them fully self-contained and easy to mount.

25 Watts. In such an incredibly small package, the IC-27A/37A/47A are able to provide 25 watts of output power.



Internal Speaker

32 PL Frequencies. The IC-27A/37A/47A come complete with 32 PL frequencies ready to go. Each PL frequency may be selected by the main tuning knob and stored into memory for easy access along with frequency.

9 Memories. The IC-27A/37A/47A have 9 memories available to store receive frequency, transmit offset, offset direction, and PL tone. Memories are backed up by a lithium backup battery, which will store memories for up to seven years.

Speech Synthesizer. As an added plus, the IC-27A/37A/47A feature an optional speech synthesizer to verbally announce

the receiver frequency of the transceiver through the simple push of a button. This allows the operator to hear which frequency he is operating on without looking at the transceiver.

Scanning. The IC-27A/37A/47A series has a scanning system which allows scanning of memories or scanning of the band.

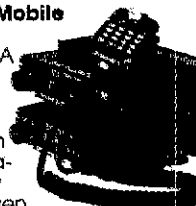
Priority Scan. Priority may be selected to be either a memory channel or a VFO channel. By using sampling techniques, the operator can determine if a frequency which he wants to use is free or busy.

Microphone. Each IC-27A/37A/47A comes complete

with a microphone with a 16-button pad for access to your favorite repeater or for dialing through an autopatch.

Stacking Mobile Mounts for the IC-27A/37A/47A make a small complete station for 1 to 3 bands. Each band is full featured and fully operational even when another band is in use.

The ICOM IC-27A/37A/47A provide superb performance in the mobile radio environment. See them at your local ICOM dealer.



ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 273747484

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History-making astronaut Owen Garriott and the Manhattan skyline are just two exciting aspects of the ARRL National Convention being held this month. Cover art by Les Schachter and Greg Grambor, WB2GMK, of Schachter & Grambor Advertising, New York City.

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MAIN MENU SCREEN

hh:mm:ss

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SELECT:

- M. MORSE
- A. ASCII
- R. RTTY
- T. AMTOR
- U. AUTO AMTOR
- X. AUTO CALL
- C. COMMANDS
- O. OPTIONS

Just Look At Some Of The Features:

- CW receive and transmit at 5 to 99 wpm, auto speed track on receive.
- 8 bit ASCII, receive and transmit at 110, 150 or 300 baud.
- 5 bit Baudot, receive and transmit at 60, 67, 75, 100 or 132 wpm.
- TOR, receive and transmit ARQ (Mode A) or FEC (Mode B) and listen.
- Beacon and WRU system, includes QRG check before XMT, won't QRM.
- Message forwarding system, AUTO-AMTOR still functions in this mode.
- Selects command menu.
- Selects options menu.

- + Complete precompose split-screen display with status information.
- + Complete printer control including SELCALL/WRU printer control.

OPTIONS MENU SCREEN

hh:mm:ss

- I. CALLSIGN ??????
- S. SELCALL ?????
- T. ARQ TIMEOUT 30
- U. USOS ON
- M. MORSE FILL (BT) OFF
- R. RTTY SYNC (NUL) OFF
- A. AUDIO FEEDBACK OFF
- C. AUTO CR ON
- L. AUTO LF ON
- B. BEACON RECORD OFF
- W. WRAP-AROUND ON
- K. CW BREAK-IN OFF
- O. OUTPUT MODE WORD

- 24-hour clock, shows time in hours, minutes and seconds.
- Allows entry of your callsign for auto operations.
- Derived from your callsign automatically, can be changed.
- Sets ARQ phasing calls from 1 to 99 seconds.
- Unshift on space, toggles on or off.
- Transmits Morse idle character during breaks in KB activity.
- Transmits RTTY idle character during breaks in KB activity.
- Sends short beep through your audio as any key is depressed.
- Sends carriage return the first space after 65 characters.
- Sends a line feed after each carriage return.
- Allows the beacon to be recorded to the QSO buffer for logging.
- Sends CR/LF if there is a space in the last 5 positions on the line.
- Automatic transmit/receive switching during QSO.
- Transmit in word mode (text sent on space) or character mode.

COMMAND MENU SCREEN

hh:mm:ss

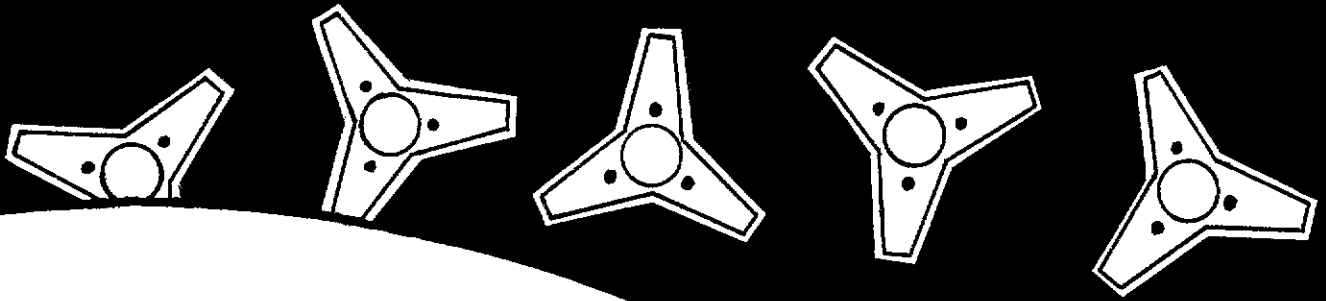
- L. LOAD
- E. EDIT
- M. MOVE
- S. SAVE
- X. SET XMT BUFFER SIZE
- C. SET COLOR
- T. SET TIME

- Break-in buffer on all modes, toggle QSO buffer on or off.
- CW speed lock and Farnsworth low-speed CW.
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The fun and excitement of OSCAR space communications are yours with one easy-to-use antenna package. You get the 416TB 70 cm uplink and A144-20T 2 meter downlink antennas, plus mounting boom and hardware for U110 elevation rotator.

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Cushcraft has combined commercially proven satellite antennas in a convenient money saving OSCAR pack, your key to enjoyment of worldwide OSCAR satellite communications, model AOP-1.



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KENWOOD

an isotoner in armstrong

TS-930S "DX-traordinary"

TS-930S

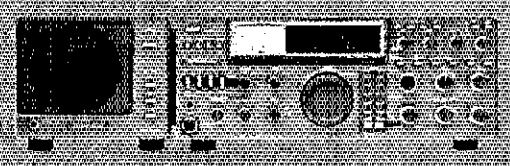
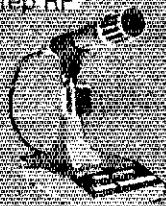
We call it "DX-traordinary" because the TS-930S has now become the favorite rig of the serious contesters. Its superior capability for full break-in split-frequency operation, the speed and convenience with which its eight memory channels can be accessed, its unsurpassed receiver dynamic range and its remarkable ability to select the desired signal during periods of heavy QRM, utilizing VBT, Slope tuning, IF Notch filtering, and tuneable audio filtering, have all combined to make this the rig that gives you the EXTRA EDGE!

The TS-930S is loaded with all the special features that you always wanted in an HF transceiver. Full coverage of the 160 through 10-meter bands, including the new WARC frequencies, (easily modified for HF MARS), plus a general coverage receiver that can tune any frequency from 150 kHz to 30 MHz. Operation in the SSB, CW, FSK, and AM modes, with selectable full or semi-CW break-in. All solid-state, with 250 watts PEP input on SSB,

CW, FSK, and 20 watts input on AM. SWR/power meter, triple final protection circuits plus two cooling fans built-in. 10-Hz step synthesized frequency control. Available with optional automatic antenna tuner built-in, another industry first. Digital VFO's. Eight memory channels that store both frequency and band information, with internal battery back-up (batteries not supplied). Dual mode adjustable noise blankers, especially effective in eliminating "woodpecker" type interference. SSB IF slope tuning, for maximum rejection of interference. CW variable bandwidth, with pitch and side-tone control. IF notch filter, tuneable audio peaking filter. Unique six digit, white fluorescent tube digital display - easy on the eyes during those long contests. RF speech processor for higher average "talk" power. SSB monitor circuit. 4-step HF attenuator. VOX. 100-kHz marker. AC power supply built-in. 120, 220, or 240 VAC.

TS-930S Optional Accessories:
AT-930 automatic antenna tuner, SP-930 external speaker with selectable audio filters, YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-98C-1 (500 Hz) CW filter, YK-98A-1 (500 Hz) AM filter, all plug-in type. SO-1 commercial stability TC XO, MC-80A deluxe desk microphone, MC-80 and MC-85 communications microphones, MC-425 mobile hand microphone, TL-922A linear amplifier (100W CW/SSK), SM-220 station monitor, PC-1A phone patch, LW-2000 SWR/power meter, 160 ~ 3 meter, SW-100A SWR/power/volt meter, 160-2m, HS-4, HS-5, HS-6, and HS-7 headphones.

Isn't it about time you stepped into the winners' circle? More information on the TS-930S is available from authorized dealers or from Kenwood Communications, 111 West Walnut Street, Compton, California 90220.



TS-930S HF transceiver with optional AT-930 automatic antenna tuner, SW-100A SWR/power/volt meter, and PC-1A phone patch.



KENWOOD

COMMERCIAL / AMATEUR RADIO

TM-201A/TM-401A

TM-201A/TM-401A
"comp-ACT" — tough act to follow.

The word "compact" best describes the TM-201A VHF mobile (13.25 watts) or the TM-401A (70-cm 11.2-watt) mobile. Measures 5.5W x 6.9H x 7.2D inches (the TM-201A and TM-401A are the most compact radios available) — ideal in size

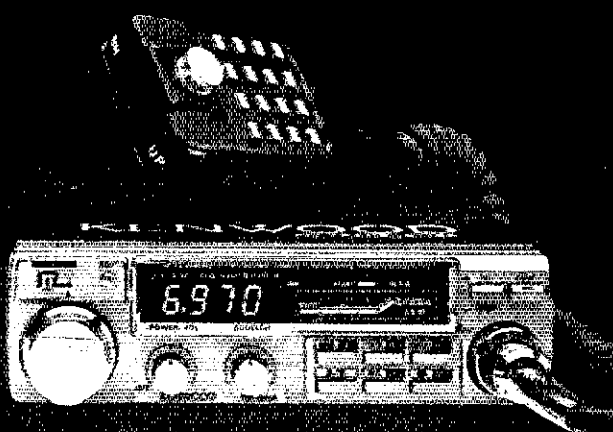
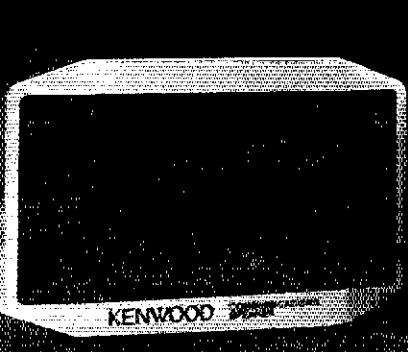
for performance. The single-sideband features a 100% duty cycle with a digital VCO and memory scan. The VFO is paired with a 100% duty cycle back-up memory scan. Programmable channels in operation also work and GaAs FET RF pre-amplifiers. They have a highly visible yellow LED channel display, repeater filter switch, a reverse switch,

and a filter to confirm reception. Various outputs, one for low-impedance and the other for high-impedance, allow for a variety of speaker connections. The digital display shows the desired channel number. Push-to-talk, PTT-AVX, allows easy mobile installation. Most functions, thanks to the VFO, are compact, radio ready. Available in the 20-cm VHF and UHF bands. Excellent performance and excellent sound quality.

Other TM-201A/TM-401A optional accessories:
 • 100% Programmable Two-Frequency (VFO A/B) Encoder
 • 13.25-Watt (11.2-watt) Power Supply VFA-4000A dual-band mobile antenna with duplexer
 • MC-55 mobile microphone
 • MC-55 mobile microphone with dual-tuner



Optional FC-10 Frequency Controller
 Connects to the TM-201A or TM-401A. Convenient controls for frequency UP/DOWN, MHz shift, VFO A/B, and MR memory recall or change memory channel. A green LED display indicates transmit/receive frequencies, memory channel number, A/B, and SCAN (with blinking MHz decimal).



TW-4000A

TW-4000A
"FM-Dual-Bander"

KENWOOD'S TW-4000A FM-Dual-Bander provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in one compact package. It covers the 2-m band (142.000-148.995 MHz), including certain WAAS and CAB frequencies, and the 70-cm band (144.000-149.995 MHz), all in a package

only 5.78 W x 6.16 H x 6.29 D inches. RF output power measures 22 watts on either band. The TW-4000A features a large easy-to-read LCD display, front panel illumination for night operations, 10 memories with OFFSET recall and lithium battery backup. Programmable memory scan, band scan in selected 1-MHz segments, priority watch function, common channel scan, digital VFO's, repeater filter switch, GaAs FET front ends, rugged die cast chassis,

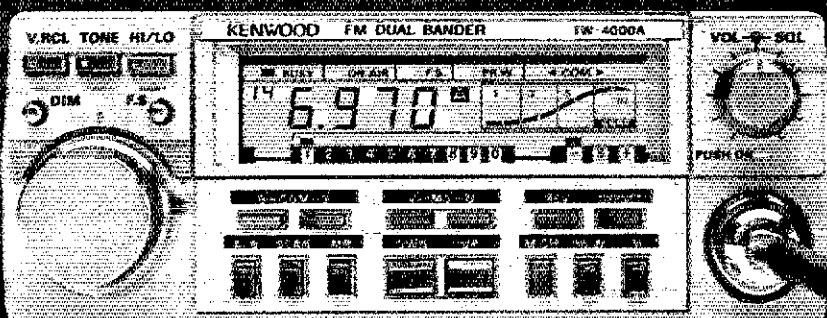
speaker through speaker or mobile mount, and a 16-key autopatch UP/DOWN mic. The new optional VS-1 voice synthesizer has everyone talking. A voice announces the frequency band, VFO A or B, repeater offset, and memory channel number when these functions are selected.

Other TW-4000A optional accessories:
 • VS-1 voice synthesizer, 104C
 • Programmable Two-Frequency Encoder, order KPS-74 fixed

power supply, SP-40 compact mobile speaker, SP-50 70-cm mobile speaker, VFA-4000 dual-band mobile antenna with duplexer, MC-55 mobile microphone with time-out timer, and a SW-100A SWR/power meter.

More information on the TM-201A/TM-401A and TW-4000A is available from authorized dealers or trip Kenwood Communications, 1111 West Walnut Street, Compton, California 90220

Some features and prices are subject to change without notice or approval.



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"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the U.S. and Canada.

All membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA. Telephone: 203-666-1541, Telex: 643958 AMRAD NEWI.

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*Executive Committee Member

"It Seems to Us..."

A New Constitution For IARU

The International Amateur Radio Union has a new Constitution. When the votes of the IARU Member-Societies were counted on May 30, there were 98 in favor of the draft Constitution and Bylaws prepared by the Administrative Council, six in favor of an amended version offered by the South African Radio League and two favoring retention of the previous Constitution. A two-thirds majority of the 119 Member-Societies, or 80 votes, was required for passage.

The new Constitution is the culmination of more than four years of cooperative effort that began in earnest during WARC-79, with a meeting of some two dozen leading radio amateurs who were present in Geneva for that all-important Conference. It was generally recognized, by this group as well as by others active in the IARU, that a more modern Constitution reflecting the realities of the modern Amateur Radio world was needed. ARRL historically had been the preeminent Amateur Radio organization in the world, with a majority of the world's radio amateurs residing in North America as recently as 20 years ago. However, rapid growth in other parts of the world had changed this: By the time of WARC-79, a number of IARU Member-Societies in other countries were ready, willing and able to assume their share of the responsibility for shaping the destiny of the Amateur Radio Service.

Soon after WARC-79, under the leadership of IARU President (now President Emeritus) Noel B. Eaton, VE3CJ, a Restructuring Committee became the focus of comments from Member-Societies and individuals throughout the world. The work of this Committee, which included in its membership the three regional Executive Committees as well as the Headquarters officers, resulted in the proposal to create an IARU Administrative Council. The Constitutional amendment to create the Administrative Council was adopted overwhelmingly by the Member-Societies in 1982. The Administrative Council consists of the President, Vice President and Secretary, along with two representatives from each regional organization selected by the respective organizations.

The Administrative Council immediately set to work on the difficult task of drafting a universally acceptable Constitution for a modern IARU. A five-day meeting in Tokyo in March 1983 led to agreement on the basic principles, after considerable discussion and compromise by all parties; a three-day session at IARU Headquarters in November resulted in completion of a draft Constitution and complementary set of Bylaws. The two documents, taken together, provide an excellent framework for the continued growth and development of the IARU.

The new Constitution contains seven Articles, organized in a logical progression. The Constitution answers the basic questions of what is the IARU, what are its objectives and how is it organized. It also sets forth the fundamental rights, duties and obligations of Member-Societies. The 18 Bylaws are more oriented toward details of procedure.

Perhaps the most important feature of the new Constitution is that the relationships between the component parts of the IARU are changed. The regional organizations, which had not been recognized at all until a 1975 amendment, become an integral part of the worldwide body, with increased authority and responsibility. The "headquarters" function is transferred to the Administrative Council, with a Member-Society serving as International Secretariat to perform administrative functions in support of the Council. The IARU President and Vice President are nominated by the International Secretariat in consultation with the Administrative Council, subject to ratification by the Member-Societies; the Secretary is designated by the International Secretariat. The officers may be members of any Member-Society; in making its selections the International Secretariat is not limited to its own officers or members. The objective is a stronger and more democratic IARU, consistent with the practical limitations imposed by finances.

Under the previous Constitution, Constitutional amendments required a two-thirds vote of all Member-Societies. At an earlier time, when the IARU was less active than it is today, this meant that inactive members could effectively block needed action, since their failure to vote had the same effect as a "nay" vote. Recognizing that this state of affairs was not in the best interests of the organization, the drafters of the new Constitution included a provision whereby the calculation of the two-thirds vote is based upon the number of Member-Societies that have recently voted on proposals brought before the IARU membership. Thus, inactive members are not penalized in any way, but their inactivity does not stand as a bar to others.

What does the future hold for IARU? No one can say for certain. The ARRL nominees for President and Vice President under the new Constitution are Richard L. Baldwin, W1RU, and Carl L. Smith, W0BWJ; both are widely respected internationally and are committed to making the new Constitution work for the benefit of radio amateurs worldwide. Their names will be presented to the Administrative Council at a meeting of the Council in Paris later this month and, assuming the Council concurs, will be submitted to the Member-Societies for ratification. ARRL will serve as International Secretariat, thus providing the administrative support and continuity required of a viable international organization without the expense of a separate headquarters. But the authority for IARU decisions rests with the Member-Societies, to be expressed through their regional organizations and the Administrative Council as well as by direct voting on proposals brought before the membership.

Through their work in drafting the new Constitution and Bylaws, the members of the Administrative Council have demonstrated their willingness and ability to work together for the good of Amateur Radio. There is every reason to believe this cooperative spirit will endure as we face the challenges and opportunities of the future. — David Sumner, K1ZZ, Secretary IARU

League Lines...

UoSAT OSCAR 11 has been restored to operation. Command signals were sent from Surrey, England, at 1101 UTC May 14. Although the 144-MHz command frequency was tried unsuccessfully, the 438-MHz commands succeeded. OSCAR 11 came to life at 1423 UTC. Strong telemetry signals on 145.825 MHz began almost immediately. See Amateur Satellite Program News for complete details.

ARRL and AMSAT have formally proposed to NASA that Tony England, WØORE, be permitted to operate an Amateur Radio station on his shuttle flight next March. In a letter to NASA Public Affairs Director Frank S. Johnson, Jr., ARRL President Larry Price, W4RA, and AMSAT President Tom Clark, W3IWI, stated that the goal of the proposal was to involve as many amateurs as possible. They also noted that "this proposal is an ideal vehicle for bringing many of the American youth into direct contact with the space program through the use of school club stations." The proposal calls for WØORE to use 2-meter equipment identical to that used by W5LFL on STS-9. England has expressed a desire to make QSOs with school club stations. The proposal also suggests a 10-meter downlink that will carry received 2-meter audio and SSTV pictures generated within the Orbiter. NASA is expected to respond to the proposal shortly.

The Louisiana World Exposition (May 12 - November 11) continues the tradition of recent World's Fairs with an Amateur Radio exhibit. The Louisiana Amateur Radio Exhibition, Inc., station K5WF, will be open from 1500-0100 UTC. K5WF will be operating on all bands and modes, including SSTV on 14,230 kHz. A special QSL card is offered to hams and SWLs for an s.a.s.e. The address is 221 Highway Dr., Metairie, LA 70121.

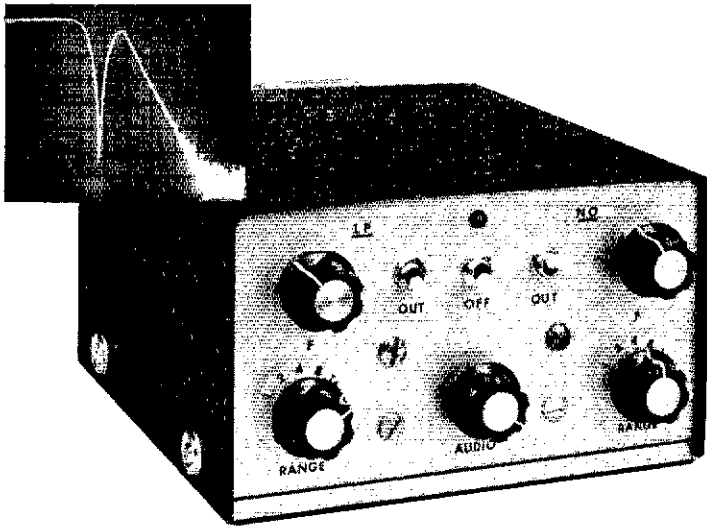
The Texas 1986 Sesquicentennial Commission gave amateurs in Texas permission to use their logo on their QSL cards. (See Happenings, January 1984 QST.) Subsequent to that date, the Sesquicentennial Commission has established a retroactive policy requiring two copies of all material produced with the logo on it to be sent to the Commission. This material will eventually be kept in the State Archives Library for permanent preservation. Send the QSL cards to the Texas Sesquicentennial Commission, P.O. Box 1986, Austin, TX 78767.

1984 Summer Olympics will have an Amateur Radio station at the UCLA Olympic Village. The station's primary purpose is to send messages home for Olympic participants from countries which permit third-party traffic with the U.S. When time permits, commemorative contacts will be given to callers. Please do not call during traffic handling periods. Watch for the call sign NG84O on the HF bands using CW and SSB.

Zimbabwe (Z2) and Hong Kong (VS6) are now on the list of temporary third-party traffic agreements for the 1984 Olympics in Los Angeles. The agreements will be in effect between July 1 and August 31, allowing amateurs to exchange third-party traffic between the Olympic Village and the athletes' home countries. It is hoped that there will be many more in response to an invitation from the U.S. government relayed through International Telecommunication Union (ITU) channels.

Completion of the rules for the Volunteer Examiner Program is expected in July. FCC has assured ARRL that we are eligible to serve in all regions, regardless of other Volunteer Examiner Coordinators (VECs) already in operation. The League plans to begin coordinating test sessions in September and October (limited at first to established hamfests and conventions). After November 1, we plan to add many more sessions sponsored by clubs and smaller groups of Volunteer Examiners (VEs). Accreditation materials will be mailed in July to all who have a VE Application on file with the ARRL.

ARRL Hq. is investigating the feasibility of establishing a central register of U.S. and Canadian amateurs who are interested in exchanging vacations and/or making travel arrangements with amateurs in other countries. Write ARRL Hq. if you want your name and address included in such a register.



Digital Switched-Capacitor Filters — A Practical Construction Project

Add this SCF to the audio line from your rig. Use the low-pass and notch filters to eliminate interfering signals.

By Richard R. Schellenbach,* W1JF and Frank Noble,** W3MT

In the article, "Switched-Capacitor Filters — An Emerging Technology for Amateur Radio Use," *QST*, March 1984, we discussed the basic principles of digital filters. We now present a practical application for Amateur Radio. The dual-filter unit described in this article may be connected to the output of any receiver, and it will drive any load of 4 ohms or more, including a small speaker. Two digital switched-capacitor filters (SCF) are contained in a small cabinet with a built-in power supply and an audio amplifier. The first SCF is a low-pass type having an extremely sharp cut-off characteristic and ultimate attenuation of 75 dB. Throughout this article we deal with voltage ratios across fixed impedances,

where $\text{dB} = 20 \log_{10} (E_2/E_1)$.

The upper-frequency limit of the low-pass filter (LPF) is continuously variable from 100 to 3200 Hz by means of front-panel-mounted controls. The second SCF is a notch filter having a 20-dB bandwidth

of 10% of the center frequency and a notch depth of 55 dB. The notch filter center frequency is continuously variable over the same range as the LPF upper limit. Also mounted on the front panel are control

switches to connect either filter in or out of the signal path.

Block Diagram

With reference to Fig. 1, the LPF is a

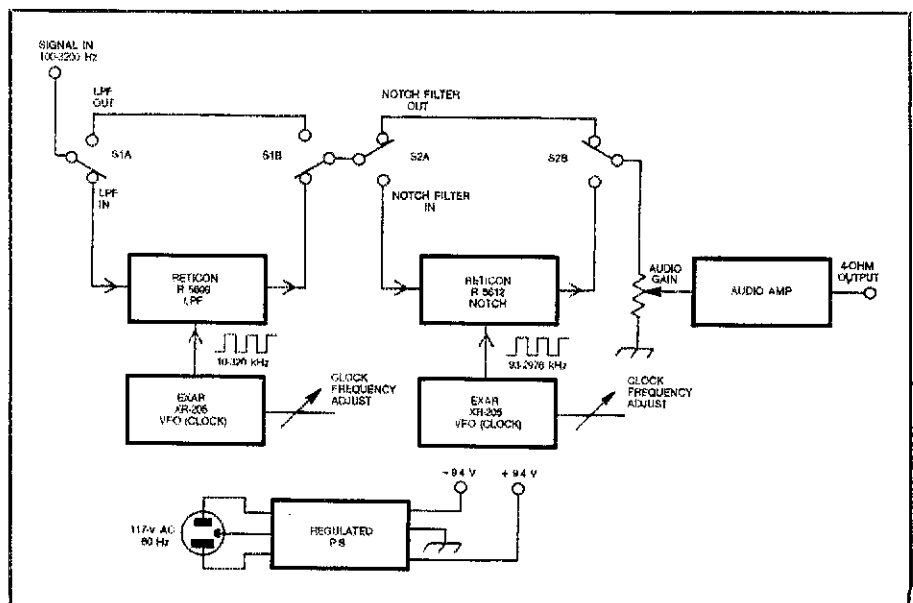
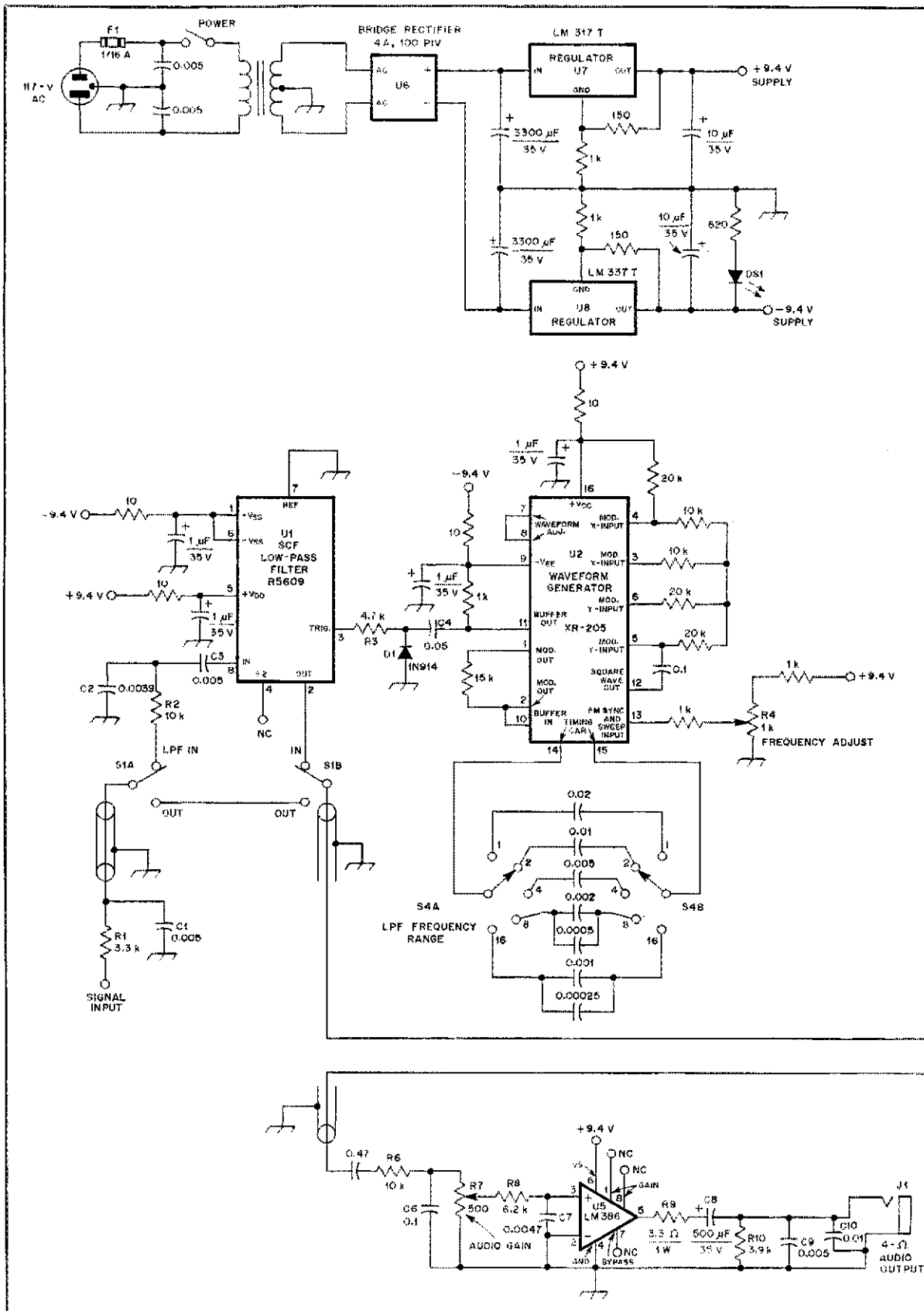


Fig. 1 — A block diagram of the SCF operation.

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 **10004 Belhaven Rd., Bethesda, MD 20817



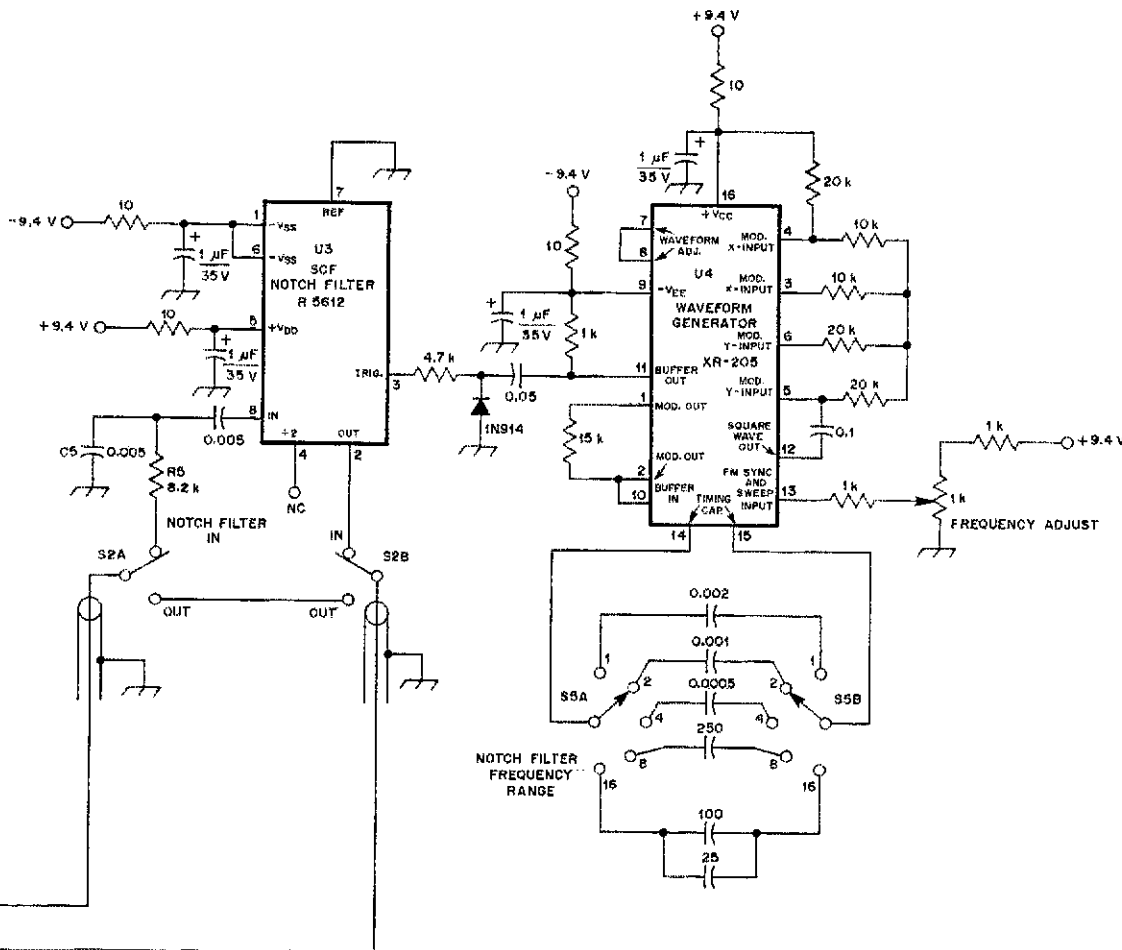
Reticon R 5609. This device requires a variable-frequency clock (VFC) continuously tunable over the range of 10 to 320 kHz. Although there are a number of voltage-to-frequency converters that can produce a square-wave output

in this frequency range, the Exar XR-205 was chosen to reduce the number of different types of chips; the notch filter requires the high speed of the XR-205.

The notch filter is a Reticon R 5612,

which requires a VFC with the same square-wave output level as the LPF, but operating over a continuous range of 93 to 2976 kHz. Most voltage-to-frequency clock generators have a 1-MHz upper limit. So the Exar XR-205, with its

Fig. 2— A complete schematic diagram of the SCF built by Frank Noble, W3MT. Parts labels are for text reference. S4 and S5 are two-pole, six-position nonshorting switches, Radio Shack part no. 275-1386 or equivalent.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR $\mu\mu\text{F}$); RESISTANCES ARE IN OHMS; $k=1000$

4-MHz limit, was selected for use here.

Circuit Details

Referring to Fig. 2, the RC filter, consisting of R1 and C1 in the signal input circuit, rejects RF pickup; it is designed for

use with audio source impedances of 5 k Ω or less. R2 and C2 comprise an input filter to the LPF IC, U1, which restricts the signal bandwidth to about 4 kHz, rejecting high-frequency noise and clock signals. Coupling capacitor C3 blocks dc so that pin

8 is held to the open-circuit voltage. R2 also limits transient currents to pin 8, protecting the IC (these are MOS chips). R3 on the clock input (pin 3) also protects the chip from transients.

The clock output from U2, pin 11, is a

3-V P-P square wave, positive with respect to ground. The dc restorer (consisting of C4 and D1) is used to shift the dc level so the negative peak is clamped to ground, as required by the LPF and notch chips. The clock range is controlled by a capacitor-selector switch, S4. Continuous variation through each range is provided by the frequency-adjust potentiometer, R4, which feeds a dc voltage to pin 13.

R5 and C5 comprise an input filter to the notch chip, U3, which rolls off above 4 kHz to reduce high-frequency noise and the residual clock signal in the LPF output. It is important to minimize the clock-signal bandwidth here because its harmonics will beat with the harmonics of the notch clock to form weak "birdies" in the output audio. R5 protects this chip from transients. This IC is also capacitively coupled to keep any input dc off pin 8. U4 is identical to U2 except that it is operating at a frequency that is about 10 times higher.

The capacitor values for the low-pass and notch-filter-clock switches are given in Table 1. The capacitors are common disc ceramics of small physical size. Standard values can be wired in parallel where necessary to obtain the specified values.

From the filter sections, the signal goes to the power amplifier. The input is capacitively coupled so that any dc on the filter outputs cannot enter the amplifier. The combination of R6 and R7 forms an attenuator to set the control range to a reasonable value. C6, shunted across R7, forms a low-pass filter to reject clock feed-through. R8 and C7 form a second filter to increase the rejection. The LM 386 is rated to drive an 8-ohm load. Since we wanted to drive a small 4-Ω speaker, R9 was added in series with the output. The output is capacitively coupled to keep dc out of the speaker, headphones or whatever else is connected to it. R10 merely charges C8 so there will be no dc surge when the load is connected. C9 is required to suppress any possibility for spurious high-frequency oscillation at high power levels; C10, at the output jack, rejects any possible RF pickup.

Mechanical Details

The filter is contained in a Radio Shack cabinet (part no. 270-253) measuring 3 × 5-1/4 × 5-7/8 inches (HWD).¹ The power transformer is mounted on the outside rear of the box to conserve space and to keep heat and ac fields out of the enclosure.

The dual regulated power supply is mounted at the chassis rear. The regulators have heat sinks insulated from ground. These consist of 1/16-inch aluminum strips 5/8 inch wide by 2 inches long. The assembly is mounted on perfboard placed upright, parallel to the rear panel.

The two filters and the audio amplifier are each built on a separate piece of perf-

Table 1
Clock-Switch Capacitor Values

Range Switch Position	Frequency Range (Hz)	LPF Capacitance (μF)	Notch Capacitance (μF)
1	100-200	0.02	0.002
2	200-400	0.01	0.001
4	400-800	0.005	0.0005
8	800-1600	0.0025	0.00025
16	1600-3200	0.00125	0.000125

board placed upright and perpendicular to the front panel. On the unit I built, the LPF is to the left, the amplifier at the center, and the notch filter to the right. Fig. 3 shows the mounting details.

The lead photo shows the arrangement of controls on the front panel. The LED power-on indicator is above the power switch, S3. The input cable entry and the output phone jack are on the rear apron.

It is necessary to reinforce this cabinet to make it usable. Both front and back panels were stiffened with an extra layer of 1/16-inch-thick aluminum and braced against the bottom plate with steel angle brackets. The bottom is fastened to a piece of 1/4-inch-thick aluminum placed below it. This heavy aluminum plate is tapped for 6-32 screws to mount the several subassemblies. The result is satisfactory, but I would not advise anyone to duplicate it. It would be far easier to start with a more substantial cabinet.

Test Results

For testing purposes, the input level was adjusted for a filter output of 6-V P-P in the passband close to the band edge. A scope probe was attached to the rotor of S2B to observe waveforms and signal amplitudes. Three test frequencies were

used: 500, 1000 and 2500 Hz. Since the oscilloscope used operates to 60 MHz, readings more than 20 dB below signal level are not very accurate because the visual presentation is obscured by harmonics, clock residue and noise. A narrower bandwidth scope may not display as much of the spurious signals, presenting a cleaner pattern. Auxiliary filters, which I do not have, are required to do the measurements with greater accuracy. Nonetheless, "eyeball filtering" can be applied to obtain "ballpark" data and to verify the filter operation.

The notch depth is at least 50 dB for all three frequencies. The 20-dB bandwidth is about 10% of the center frequency in all cases; the 40-dB bandwidth is about 2%.

For the LPF, starting at the half-power point (71% of peak voltage), the attenuation with respect to the half-power voltage is 20 dB at 15% above the cutoff frequency, 40 dB at 20% above, and 50 dB at 50% above. In all cases, the test data confirm the Reticon specifications within our measurement margin of error. These are truly spectacular filters.

Operation

The input signal level may be in the range of 4- to 12-V P-P. This is obtained either

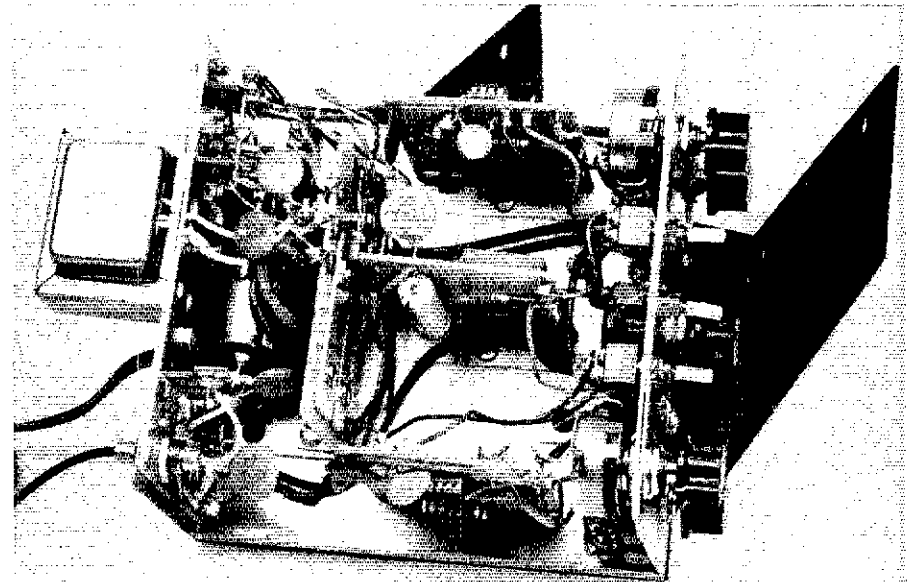


Fig. 3 — The mounting details for the filter components. The power transformer and associated components are on the back panel, and the regulator parts are on the piece of perforated board that is parallel to the panel. The audio amplifier is on the board in the center of the cabinet. The LPF is on the board toward the bottom of the photo, and the notch filter is on the board mounted toward the top. A homemade feed-through bushing was used to pass the RG-174/U signal-input cable into the cabinet. A rubber grommet could also be used for this purpose.

¹Notes appear on page 15.

directly from the receiver output or by means of a step-up transformer, amplifier or other method. Low signal levels should be avoided because clock birdies may become objectionable. Levels above 12-V P-P (4.25-V RMS) exceed the chip ratings. Since these are MOS devices, a signal should be applied only when the filter unit power is on.

The switching system is apparent. Clock frequency and, accordingly, signal-frequency band edges increase with clockwise rotation of the frequency-control potentiometers. The potentiometer frequency ranges exceed 2:1, so that any capacitance errors will not produce gaps in the frequency coverage. The numbers on the capacitance-selector switches are 1/100 of the low-end frequency; thus, position 1 covers the range 100-200 Hz, position 8 covers the range 800-1600 Hz, etc. There is considerable overlap for the reason cited above.

Observations

Low-level beats occur between harmonics of the signals and harmonics of the clocks in both filters. Also, weak birdies occur in the notch output when the LPF is on. These are caused by residual clock harmonics in the LPF output beating against harmonics from the notch clock. These spurious signals are reduced relative to the desired signal as the desired signal level is increased.

Our original thought was that placing the LPF ahead of the notch filter would be preferable because any excessive high-frequency noise would be removed before the signal reached the notch filter. It may be preferable to place the notch filter first, however, because the residual output from the notch clock is easier to filter out. (This clock frequency is about 10 times higher than the LPF clock for a given band-edge frequency.)

In any case, the birdies are of such low level as to be almost inaudible in normal use. If you find them objectionable, some of them may be removed by slight changes in the LPF clock frequency, which is usually not critical to listening operation.

Anyone used to narrow band-pass audio filters (as I am) will find this filter to be easier on the psyche. On CW, the desired signal is tuned to a 700-Hz beat and the LPF is cranked down to where it just begins to cut off the signal. The reduction in high-frequency noise and QRM is truly impressive and, unlike many analog-type filters, no ringing occurs.

The audio beat of an interfering signal becomes inaudible when properly notched out; only the high-order keying sidebands are passed. For example, a 24-WPM dot string is a series of square waves with a fundamental frequency of 10 Hz. Assuming that at least the second through fifth harmonics must be contained in crisp keyed CW, the signal bandwidth is 100 Hz, which

Selected SCF Devices

American Microsystems, Inc., 3800 Homestead Rd., Santa Clara, CA 95051
Related digital filter product line:
S2815 — Digital Filter/Utility Peripheral
S3526 — 2600-Hz Band-pass/Notch
S3528 — Programmable LPF (7-pole elliptic function, programmable)
Reference: "Telecommunications Design Manual," AMI, 1982.

Cooperman, M. and C. W. Kapral, "Integrated Switched-Capacitor FDNR Filter," *IEEE Journal of Solid State Circuits*, Aug. 1983, Vol. SC-18, No. 4, pp. 378-383.

Cox, D. B., "A Digitally-Programmable Switched-Capacitor Universal Active Filter/Oscillator," *IEEE Journal of Solid State Circuits*, Aug. 1983, Vol. SC-18, No. 4, pp. 383-389.

EG & G Reticon, 345 Potrero Ave., Sunnyvale, CA 94086
Device type:
R5609 — 7-pole, 6-zero, elliptic low-pass SCF
R5612 — 4-pole, notch filter (greater than 50-dB rejection at notch frequency)
R5622 — Quad, 2-pole resistor-programmable universal filter (LPF, BPF, HPF and notch — dynamic range: up to 96 dB, wide frequency range and high Q).

EXAR Integrated Systems, Inc., 750 Palomar Ave., Sunnyvale, CA 94088
Device type:
XR-205 — Waveform generator (sine, square, triangle, ramp, and sawtooth). Maximum frequency 4 MHz, voltage controlled.

Motorola Semiconductors, 3501 Ed Bluestein Blvd., Austin, TX 78721
Device type:
MC14414-2 — Pulse-code-modulation sampled-data filter (dual 5-pole elliptic LPF function).
Reference: Motorola, Inc., data sheet, DS9833, 1980.
MC145414/145415 — Dual-tunable, linear-phase, low-pass sampled-data filter. (Pair of fifth-order elliptic LPFs.) Passband tunable over the range of less than 1.25 kHz to 10 kHz.
Reference: Motorola, Inc., data sheet, DS9557, 1982.
MC145431 — Tunable low-pass/band-pass filter (7-pole elliptic and 4-pole band-pass, independently tuned with external clock).
MC145433 — Tunable notch/band-pass filter (independently tuned notch and passband).

National Semiconductor, 2900 Semiconductor Dr., Santa Clara, CA 95051
Device type:
MF10 — Universal dual switched-capacitor filter (dual 2nd-order functions: high-pass, low-pass, notch and band-pass).

Radio Shack, Division of Tandy Corp.
Device type:
Cat. no. 276-2329 (MF10) — Universal dual switched-capacitor filter directly interchangeable with National Semiconductor MF10, above).

is wider than the 20-dB bandwidth of the notch when centered on 700 Hz. The observed clicks are very weak for signals having proper keying envelopes if the notch filter is centered on the audio tone.

For phone use in noisy situations, the LPF may be cranked down to the narrowest bandwidth permitting intelligibility, which is a function of the signal strength. CW and heterodyne signals may be eliminated by using the notch filter.

Acknowledgments

When this article was first planned, after our original research on the subject, it became obvious that in order to do justice for more research facts we would need the semiconductor industry to provide their latest technical advice, including information on future products.² Also, because of budget considerations, assistance and cooperation in obtaining the necessary device samples and data would be necessary in order to quantify applications data into Amateur Radio requirements.

In this regard, we have nothing but the utmost gratitude for the assistance of Mr. Roy Zappia of the G. Rosen Company, Inc., the local manufacturer's representative for EG & G Reticon, and Mr. P. T. Cody, the Eastern Sales Manager of EG & G Reticon, Salem, Massachusetts.

Reviewing the many available and future products to be released using switched-capacitor filter technology, it became obvious that Reticon's devices were the most versatile for Amateur Radio applications as well as being the "Cadillac" of the SCF industry.

In addition, this article would not have been possible without encouragement and cooperation from the semiconductor industry and, last but not least, Dennis J. Lusia, W1LJ, who, in recognizing the advantages of SCF technology, provided the impetus to produce these articles.

Notes

¹mm = in × 25.4.
²R. R. Schellenbach, "Versatile Switched-Capacitor Filter with Automatic Level Control," Technical Correspondence, *QST*, Nov. 1982, p. 52.

Strays

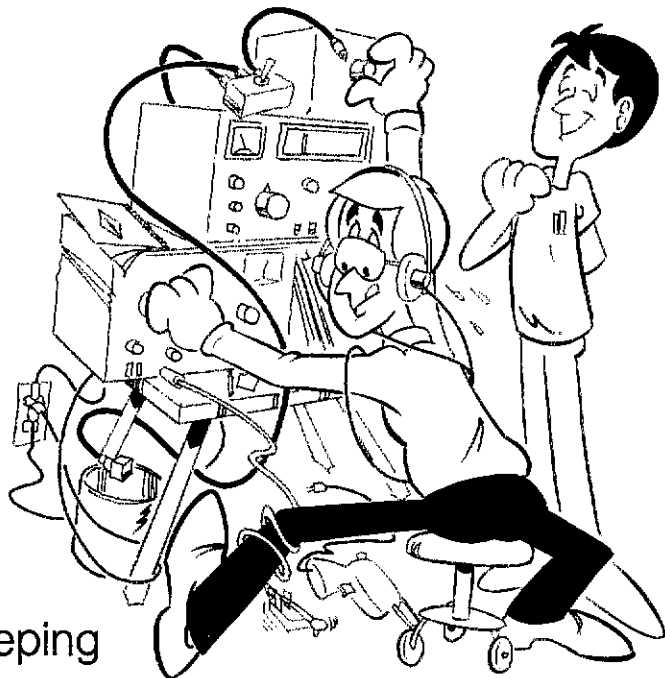
BEGINNER'S CODE COURSE

An on-the-air code course for beginners is being transmitted Monday through Friday, from 6:30 to 7 A.M. PDT, at or near 3865 kHz. For more information, write to Fred Silveira, K6RAU, 1611 Evette Ct., Merced, CA 95340.



Setting Up Your Station

Amateur Radio is supposed to be fun, but an awkward ham-station setup can turn enjoyment to frustration. Good lighting, orderly layout and other housekeeping measures can make a big difference.



By Doug DeMaw,* W1FB

How orderly and convenient is your station layout? Chances are you have a few annoyances when you sit down to operate — caused by too little room, cluttered equipment stacks and awkward methods for changing antennas. All of this may be complicated by poor lighting that can make your shack seem like it's in a crypt or a wine cellar. I know a chap who runs a kilowatt almost nightly, but burns a single 60-W lamp in his shack because "it saves money to use smaller bulbs." This old "penny-wise and pound foolish" philosophy can lead to a lot of squinting and shadowy QSOs for no good reason. I'm sure the spiders and other creatures of the night are pleased with my friend's subdued lightning, but I'm not.

I've seen other ham stations that required an octopus to keep things on track. Controls are out of reach from the operator's position, antenna changeover necessitates unscrewing and reconnecting coaxial cables to other terminals, and what have you. I marvel also at some CW operators who use a tiny desk or table, with barely enough room for the key or paddle let alone the operator's arm. If I were to operate CW in that manner I'd fatigue and develop a "glass arm" in a matter of minutes.

I certainly don't consider myself an oracle when it comes to laying out a radio station, but I do love convenience and an orderly setup in my station, especially for

contesting and fast band changing. Furthermore, I have always been afflicted with an incurable case of lassitude, which makes me want to have things as easy as possible. I'd like to share some of my thoughts with you in the hope they will give you some ideas for your station. Those who have network-studio-quality consoles need not read further!

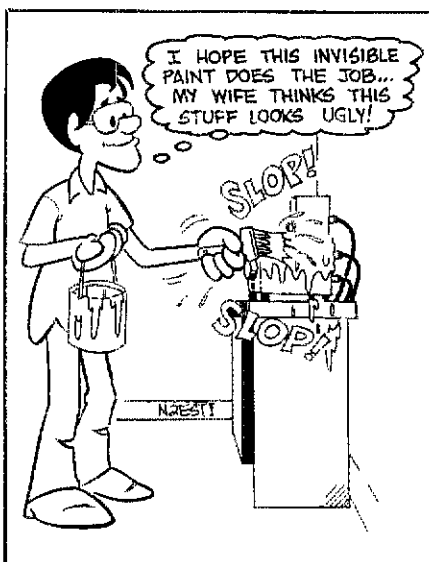
The Operating Desk or Table

Some amateurs are tempted to occupy the smallest space possible when setting up their ham stations. This is often inspired by a misbelief that ham gear is ugly, and

that family members or visitors might be offended by a spread of radio equipment in some frequently occupied room. I have found that most nonamateur guests are fascinated by ham stations, irrespective of the size of the "shack." I have yet to hear, "Oh my, how dreadful that looks in your home!" If the layout is neat and well-organized, it can look very impressive to outsiders. But, if you try to cram a lot of equipment on too small a desk, overall appearance will suffer. Small operating positions are difficult to endure for long hours of operating, and there can be a psychological effect on those who tend to suffer from claustrophobia.

A small table or desk can be expanded easily and inexpensively by adopting the method illustrated in Fig. 1. Drawing A shows a new and larger desk top made from 1/2-inch plywood.¹ This platform can be any size you prefer, provided it is not so long that it sags at the hangover points. Too great an overhang — especially if equipment is sitting on that part of the platform — will cause warping and sagging with time. This plywood addition can be placed on an existing small table or on an office desk.

Framework A (illustrations A and C) is affixed to the bottom surface of the platform to keep it from shifting on the desk top. It should be approximately 1/8 inch larger inner opening than the desk or table top. Screws or white glue may be used



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¹mm = in × 25.4.

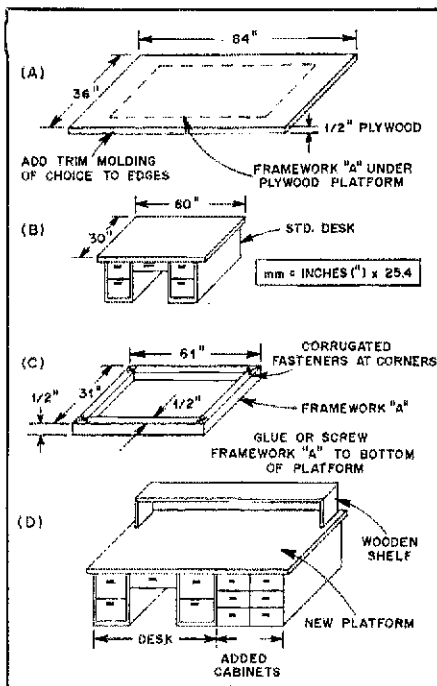


Fig. 1 — Suggested methods of increasing the area of an operating desk. Drawing A shows a false desk or table top that can be added to provide more desk-top room. Sketch B shows a typical desk on which the new platform can be added. Details of a wooden frame for keeping the new top in place is shown at C. The method at D shows the addition of two chests of drawers and a desk-top shelf.

secure the frame to the platform. Scotch fasteners or corrugated nails will hold the corners of the framework in place until it is affixed to the platform. The upper surface of the platform can be finished with stain and two coats of varnish. Alternatively, a sheet of Masonite® may be added to provide a smooth, attractive surface. You might opt for a top surface of Formica® if a truly professional finish is desired. Trim molding or Formica is added to cover the raw edges of the platform.

Fig. 1D shows a further elaboration of the general concept. You might want additional drawer space for storing clip leads, tools, cables, microphones and such. If so, one or two chests of drawers can be added as shown. They will also help to support the large platform you have added to your desk. Finally, a homemade wooden shelf can be placed atop the new platform as shown. Fig. 1D is representative of the operating layout I use at W1FB. My desk is an old office type (wooden) with a multitude of scars and dings. It was purchased for a very low price at an office auction. Some sandpaper and a coat of gray paint gave it a needed facelift.

Where to Place Your Gear

Convenience is of paramount importance in your radio station. Those units that require frequent adjustment, such as transmitters, receivers, transceivers,

Transmatch and keyer, should be toward the front of where you sit, within arm's reach if possible. You should not have to leave your chair to adjust those items of equipment. The receiver or transceiver tuning knob needs to be immediately in front of your right or left hand, depending on your natural inclination. Analog or digital frequency readout displays should be in your direct line of vision to ensure easy and accurate frequency adjustment. The station accessories that require infrequent attention are best arranged off to the right or left of your main focal point.

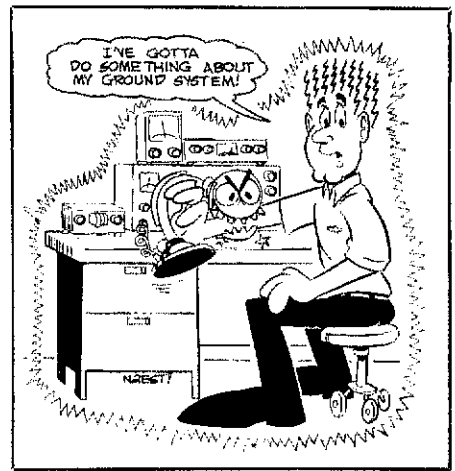
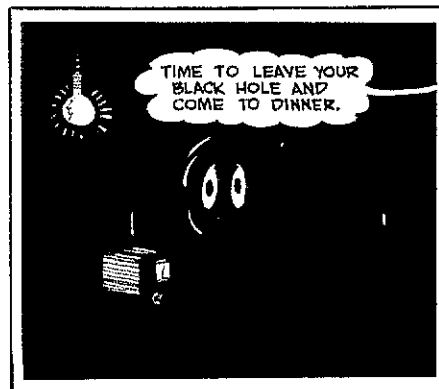
Hand keys, bug keys and paddles need special attention with regard to location. The primary consideration is to have the unit placed so that your sending arm is completely supported by the table from the key to your elbow. Your arm should rest easily and comfortably when you are sending CW. Only your fingers should be used to manipulate the key (left-footed sending, known fondly as QLF, is being ignored here).

I suggest you experiment with the placement of your key to find a spot that results in complete ease when sending. Anchor the key to that spot by means of double adhesive-backed tape pieces or pads. These are generally available at building-supply stores. How often have you heard someone try to excuse poor CW sending by saying, "Sorry my sending it so sloppy, but my paddle is sliding all over the table." The cure is simple, if that's the real cause of some of the bum fists we hear!

If you suffer from a "glass arm" after sending for long periods, try elevating your key or paddle on a 1/2- or 3/4-inch platform to raise it above desktop level. An old timer suggested this trick to me some years ago. It helped me to avoid sending errors created by my arm muscles stiffening because of high-speed CW tension during long transmissions. The remedy may have been purely a psychological one, but it did work.

Brighten Your Shack

Dim lights mean hard-to-read dials and meters. Logging and note taking is often more accurate when we can plainly see what we're putting on paper. Although a



cocktail-lounge atmosphere is comforting to some operators who prefer ragchewing as a steady diet, I believe good lighting is essential to sharp operating. It's too easy to become inattentive, or even drowsy, when the light level is very low.

I prefer a medium-intensity light source behind my left shoulder (a lamp with a 100-W bulb and a lampshade that permits plenty of light to pass through it). A reading lamp on the desk is also an aid to easy operating. I use one of those adjustable lamps on a movable arm. It clamps to the edge of my desk. A 60-W bulb furnishes ample illumination. I direct the light toward the table top, directly in front of me, which is helpful for logging, note taking and reading.

Be Sure You're Grounded

An effective earth ground is nearly as important as the antenna system. I say this from a safety and TVI/RFI point of view. All electrical units in a ham station should be connected to a ground system to prevent accidental shock and to minimize the flow of RF energy except via the intended paths. I strip the shield braid from RG-8/U or RG-11/U coaxial cable and use it for the ground bus in my ham shack. It is stapled to the back edge of my operating desk from one end to the other. This enables me to attach short ground straps (also made from shield braid) to each piece of equipment.

From the main ground bus I use additional shield braid to a pair of 6-foot ground rods that are driven into the soil just outside my shack window. A second ground lead passes through the floor to the cold-water pipes in my basement. At those points where the sections of copper braid are joined, I ensure a good electrical bond by using solder. I cannot adequately express the importance of good grounding.

For ease of grounding, and for other reasons, you will fare much better when you can locate your radio room on the first floor or in the basement: The longer the ground lead, the greater the difficulty you will have in keeping the RF voltage off your equipment cabinets, microphones and keys.

A second- or third-floor installation is apt to cause tingling sensations when you touch the metal parts of your equipment during transmission periods! This is caused by unwanted RF energy flowing on the cabinets and leads instead of flowing to ground through the intended path. I've had this experience many times, and nothing short of tuning the ground lead (as you would with an antenna) for each band of operation seemed to stop the nightmare. I've heard my wife yelp in anguish more than once when she touched a lamp and received an unwelcome RF tingle!

RF in the shack can also cause the keyer to misfire and send gibberish, to say nothing of encouraging transmitter and frequency instability in severe cases. The moral of this story is to install as short and effective a ground system as possible. The larger the ground conductors the better.

Getting the Feed Line into the Shack

Bringing our feed lines into the house causes aesthetic and practical problems. At some point we must ask ourselves, "Have I the courage to make holes through the wall of my home?" Most hams say, "No." But several years ago I took a wanton outlook and decided that convenience was more important than honoring the sanctity of the outer wall of my radio room. The saber saw was put to work, and a nice feed-through jack panel resulted.

Fig. 2 shows the method I used then, and continue to employ. An aluminum plate of identical dimensions and layout is used on the inner and outer house wall. The size chosen will depend on how many lines you plan to feed into the shack. I always include a through-connection for bringing in the earth ground. A 1/4-inch bolt is suitable, although smaller diameters are probably okay. Short lengths of coaxial cable are used within the wall to join the

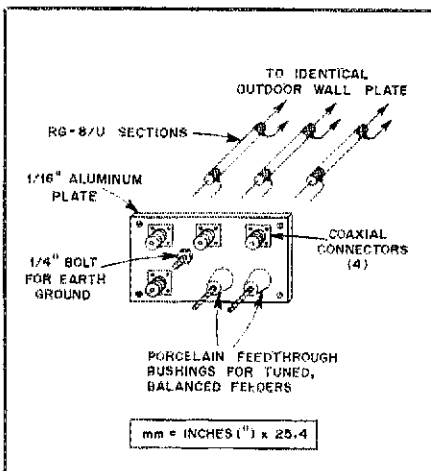


Fig. 2 — A method for bringing feed lines into the house. Two wall plates with suitable antenna connectors and a ground post can be joined by lengths of coaxial cable. A rectangular hole must be sawed in the outer and inner walls of the house where the feed-through panel is installed.

coaxial-connector jacks. The shield braid is made common to the wall plates at both ends of the cable. A short section of shield braid joins the two ground terminals, and the feedthrough bushings are joined by pieces of RG-8/U inner conductor and insulation. The braid and outer jacket are removed from these leads. All leads are soldered in position at one of the plates, then the plate is installed by using four wood screws. The outer-wall plate is allowed to hang loose until all leads are soldered to it. This requires that all leads be somewhat longer than the wall thickness in order to have access to the rear of the jacks.

A layer of caulking compound is spread along the perimeter of the outdoor plate before it is screwed into position. This will prevent dust, air and moisture from entering the space between the walls. If you decide later to sell your home, it will be a simple matter to cover the holes where the panels were. Some window screen, joint or spackling compound, and paint will do the job rather handily.

An alternative to this type of access is to make a panel that will fit snugly under the lower part of the window in the shack. Fig. 3 illustrates this method. A panel of suitable size is inserted between the window casing and the bottom of the raised lower-window section. Weatherproofing material should be placed around the insert panel. Foam rubber or plastic stripping needs to be wedged between the upper and lower window sections where the gap will be formed. If you use a storm window on your home, this method will present a problem unless you have your storm window shortened and install a second insert panel of the kind in Fig. 3. I don't care much for this method, but I have used it a number of times.

A third technique for bringing antenna

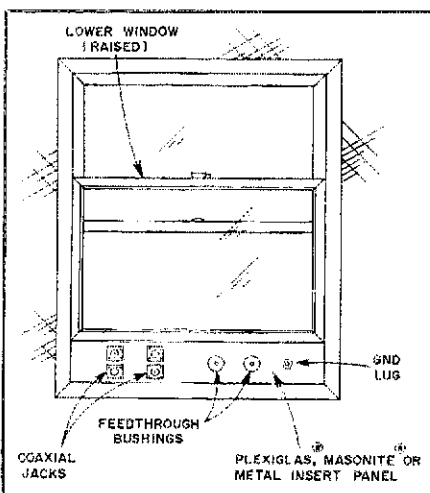


Fig. 3 — Alternative method for bringing feed lines into the station. The lower half of the window is raised, then a feedthrough panel is placed under it. This requires extensive weatherproofing, and may not be the best way to deal with the problem.

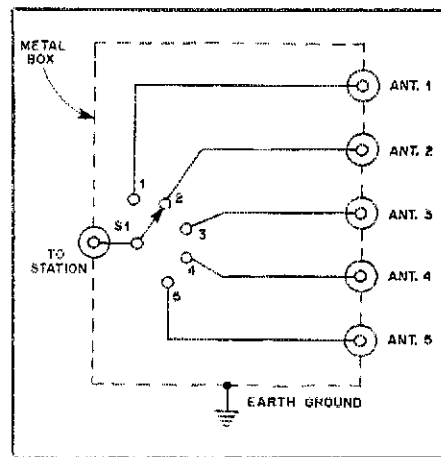


Fig. 4 — Schematic diagram of an easy-to-build switch box for selecting various antennas from within the shack. See text.

leads into the house involves routing the cables through the foundation of the house, into the cellar, and then through the floor of the radio room under the desk. A large number of hams have adopted this technique. A section of wall molding can be removed for this purpose. Later, if the house is to be sold, or the shack moved to another room, the molding strip can be replaced to cover the holes in the floor.

Antenna Selection

We mentioned earlier the annoyance of unscrewing cable connectors and reconnecting them in order to change antennas. It is a simple job to build an antenna switch box (or you may purchase one). A circuit example is given in Fig. 4. I use this method in my station. The switch box is within reach from my operating position. Coaxial jacks of your choice can be used as connectors. I recommend a well-insulated switch with large electrical contacts, preferably a rugged ceramic switch. Many of these can be found at flea markets and in surplus stores. My present switch is an Ohmite power-tap switch. I paid \$1 for it (new) at a ham flea market. It handles 1 kW of RF power very well at 50-ohms line impedance. My switch box is mounted just below my feed-through panel.

Some Final Touches

A degree of "law and order" is needed to prevent the numerous ac cords of your equipment from becoming a tangle of hissing snakes. Nothing looks worse in our stations than power cords dangling and coiled haphazardly every which way!

I have found that the best way to deal with the problem is to install a multioutlet strip (or two) along the back wall or rear edge of the desk. Each equipment cord is plugged into it, then folded back on itself several times until it is just long enough to reach the plug strip. A couple wraps of tape or long garbage-bag "twistems" can be

used to keep the cord folded neatly.

The plug strip is then connected to the wall outlet through an ac line filter that has its case attached to the earth-ground bus. The filter will not only help to prevent your RF signal from being radiated by the power lines, but it will filter away some of the QRN noise that enters the shack via the mains. Many a case of TVI or RFI has been cured by the simple installation of a "brute-force line filter." No shack should be without one.

A circuit you can duplicate is shown in Fig. 5. You may want to build this filter as your workshop project this month. The coils can be wound on hot/cold type PVC tubing. C1, C2, C3 and C4 are disc-ceramic capacitors with a 1.5-kV dc rating. Be sure to use heavy-gauge enameled wire for the coils. I suggest no. 14 wire for rigs under 150 W. No. 12 wire or larger should be used for greater amounts of ac power.

Warning: Do not plug the line filter into the ac outlet until the earth ground is attached to it. Without the ground connection you can get a mild shock if you touch ground and the filter box or equipment cabinets at the same time. Be sure to wire the plug and socket as shown (neutral, hot and ground connections). The filter should be installed as close to the station equipment as possible to prevent radiation of RF from the ac leads to the filter box. In an ideal situation we would have a separate line filter for each piece of RF equipment. These filters would be located inside the equipment cabinets, or attached to the rear walls of the cabinets.

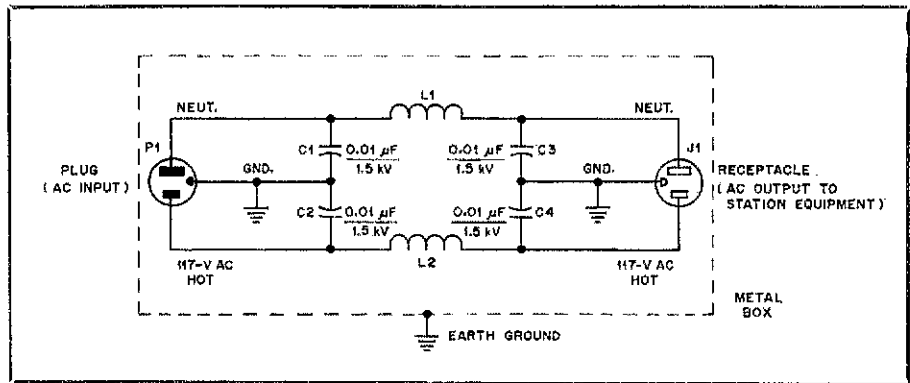



Fig. 5 — Schematic diagram of a brute-force line filter for preventing RFI and TVI from the station transmitter. The capacitors must be able to handle the line-voltage surges. Disc-ceramic units with a 1.5-kV or higher rating are recommended. L1 and L2 are 8-inch lengths of PVC pipe on which no. 14 enameled wire is close wound over a 7-inch area. The filter is enclosed in a metal box, to which an earth ground is attached.

If you use an amplifier to increase your station power, it is best to operate it from the 234-V mains in your house. High-power amplifiers (1 kW, for example) draw a lot of current from the line, and most homes do not contain 117-V ac lines that are suitable for big amplifiers. They will operate, for certain, but the plate voltage in the amplifiers will sag (drop) considerably during key-down periods, and the power output will decline as a result. Worse still, the lights in your home will blink each time you key the transmitter. That *will*, without question, elicit some pointed comments from others in your home! This is not normally a problem when the amplifier

is connected to the 234-V lines.

A separate ac line of this kind should be routed to the radio room by a licensed electrician. It must be attached to the circuit-breaker box so it is protected from overloads. The outlet in your shack should be a 234-V type to prevent accidental connection of 117-V equipment.

In Closing

An organized and safe ham station is a joy to use. Yours will be much better if you adopt some of the ideas presented here, and it matters not whether the gear is homemade or commercial. Good luck, and may your titivating be titulating! 

Strays



NEW 2-METER BAND PLAN TO BE DEBATED NEXT MONTH

□ The Texas VHF-FM Society has issued a call for comments, either in person or in writing, on a proposal to change from a 15-kHz spacing band plan to a 20-kHz band plan between 146 and 148 MHz. A forum for the presentation of these papers and comments will be held at the summer meeting of the Texas VHF-FM Society in Austin, August 11, 1984. Substantial time will be allotted for both presentation and debate of the issue. This forum will be chaired by Joe Jarrett, K5FOG, past president of the Texas VHF-FM Society and past 5th call district member of the ARRL's VHF Repeater Advisory Committee (VRAC).

Papers must be submitted at least 30 days in advance of the meeting. Papers read at the forum will be those judged to best

represent the various sides of the issue. If the author is unable to be present, the paper will be read by a competent speaker. All papers submitted will be available for review by forum attendees.

Speakers who wish to make a presentation at the forum without a written paper must submit an outline of their talk at least 15 days in advance of the meeting. If more speakers apply than time permits, one or more representative speakers will be picked from each of the various sides of the issue. Speakers are expected to remain for the debate.

All correspondence should be addressed to Joe Jarrett, 8501 Spring Valley Dr., Austin, TX 78736.

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

□ Wonder what you've been missing by not subscribing to QEX, the ARRL

newsletter for experimenters? Among the features in the June issue were:

- Part 2 of the RSGB article, "The GB3US Mk2: A Microprocessor Repeater Logic System," by A. J. T. Whitaker, G3RKL
- Do you own a Heathkit ET-3400A Microprocessor Trainer? Double its memory capacity using a modification by Donald G. Varner, WB3CEH
- Two new products are reviewed: The Linker 100: an Industrial Portable Terminal/Controller, and The Motorola MC3361P: a low-power narrow-band FM-IF circuit

QEX is edited by Paul Rinaldo, W4RI, and Maureen Thompson, KA1DYZ, and is published monthly. The special subscription rate for ARRL members is \$6 for 12 issues; for nonmembers, \$12. There are additional postage surcharges for mailing outside the U.S.; write to Headquarters for details.

A Bit Pattern Analysis Program for the Apple[®] and the C 64[™]

Print those unprintable RTTY signals with this FSK detective program for your shack computer.

By Russell Hamilton,* K3RH

Radioteletype (RTTY) signals are everywhere. Amateurs are using Baudot, AMTOR and ASCII at 45, 100 and even 300 bauds. There is a continuous frequency-shift-keyed (FSK) signal near 10.140 MHz, and there was a pirate FSK station drifting in and out of the 40-meter band last year. When you come across an FSK signal you can't print with your nifty new AMTOR-ASCII-Baudot converter, how can you tell if it is your fellow amateurs experimenting or some commercial station eating away at our precious spectrum?

RTTY transmissions use binary codes in which each character is represented by a sequence of ones and zeroes (binary digits, or bits). Table 1 shows some common codes. Usually, these codes are transmitted using FSK. To send a one, the transmitter sends on a frequency called the mark frequency. To send a zero, the transmitter is shifted to another frequency called the space frequency. The duration of a mark or space that represents a single one or zero is called the bit period. The number of bit periods in a second is the transmission rate, or signaling rate, of the RTTY signal, usually expressed in bauds or bits per second.

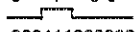
A station receiving FSK signals has a demodulator that converts the shifting frequencies into a series of changing voltages, or currents, that represent the ones and zeros of the transmission code. Then, a mechanical teletypewriter, or a computer program, converts the codes into characters for display. To receive correctly, the receiving station must know the signaling rate and the binary code the transmitting station is using.

Unfortunately, pirate stations using FSK

Table 1
Binary Codes for the Letter "A"

AMTOR	1110001
ASCII	1000001
Baudot	11000

Table 2
Digibit 1.0 Sampling and Interpretation Sequence

(A) Transmitted data	0 1 0 0
(B) Demodulator output	
(C) Digibit 1.0 samples	000111000000
(D) Pulse widths (no. of samples)	3 3 6
(E) Pulse widths (μs)	756 756 1512
(F) Digibit 1.0 output	0 1 0 0

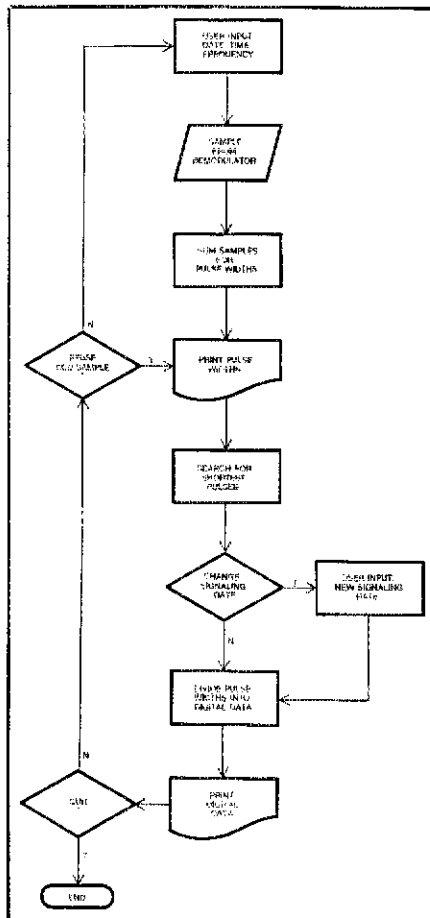


Fig. 1 — Simplified flow chart for the Digibit 1.0 program.

in the amateur bands often use nonstandard transmission rates and complicated codes. These stations are difficult to identify, even using modern, computerized RTTY equipment that allows reception of Baudot, ASCII and AMTOR at any transmission speed. The computer program presented here is a tool for identifying FSK transmissions of unknown code or speed.

The Program

The program is called Digibit 1.0. It is written partly in 6502 assembly language and partly in BASIC. Although it was originally written to run on the Apple II, a version for the Commodore-64 has also been developed. This article should provide enough information for the ambitious amateur to write a Digibit program for his/her own computer. Refer to the flow chart in Fig. 1 as we discuss the program.

How It Works

Digibit 1.0 first samples the signal coming from the station demodulator. The sampling process lasts 33 seconds. Samples are either ones or zeros, representing marks or spaces (Table 2[C]). When the sampling is over, the program adds up sequences of adjacent ones and sequences of adjacent zeros to arrive at mark and space pulse widths (Table 2[D]). These pulse widths may be converted to seconds by multiply-

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Table 3
Partial Printout of Mark and Space Pulse Widths

```
82 - 94 127 - 265 83 - 180 127 - 92 561 -- 95
562 - 93 563 - 93 564 - 94 125 - 92 172
- 90 302 - 439
```

Negative values are space pulses.

ing by the sample period, 252 microseconds (Table 2[E]).

Digibit 1.0 will display pulse widths, with positive numbers for mark samples and negative numbers for spaces (Table 3). However, this is not very informative, since we still can't tell what the station was sending. Is it some ham on the wrong signaling rate, or is it a pirate stealing some of our valuable spectrum?

To find out what data is being sent, we must determine the signaling rate at which it is being sent. Knowing the signaling rate, Digibit 1.0 can divide the long mark and space samples up into sequences of bits as shown in Table 2(F).

Finding the Transmission Rate

Digibit 1.0 tries to determine the rate of transmission automatically. The program searches for the shortest mark and space pulses, assuming they represent the bit period used at the transmitting station. Unfortunately, the shortest marks and spaces are often caused by noise on the received signal, and Digibit 1.0 is fooled.

The program is tied to rigid mathematics, but you can exercise human intuition. By examining the pulse widths printed by Digibit 1.0, or by listening to the signal on the receiver, you can make an assumption about the bit period or the signaling rate. Then, you can replace the program's calculated signaling rate with your own estimate.

Back to Bits

Once you have selected a bit period or signaling rate, Digibit 1.0 converts long mark and space pulses into bits. This process involves dividing long mark pulses into series of ones, and long space pulses into series of zeros. Of course, a mark or space that is one bit period in duration represents only a single one or zero.

What about a mark that is longer than one bit period but shorter than two? With noisy signals or an incorrect choice of bit period, some mark and space samples will not divide evenly into bits. Digibit 1.0 assumes that 0.7 bit is, in fact, a bit. Anything under 0.42 bit is ignored. Samples with between 0.42 and 0.7 extra bit are assumed to represent reception errors. These errors are printed as strings of "?"'s in the output data.

Recap

We have now seen that Digibit 1.0 takes a 33-second sample of the received signal

Table 4
The Effect of Varying the Number of Bits per Printed Line

```
(A) 01010 (B) 0101 (C) 010101
      10010
      11100
      10100
      ↓
      0100

      0100
      0111
      1001
      0100
      ↓
      00

      001011
      100101
      00
      ↓
      00
```

and converts this sample into mark and space pulse widths. Then, based on a signaling rate chosen by the program or the operation, Digibit 1.0 divides the pulse widths into strings of ones and zeros (bits).

Interpreting Output

It has taken much longer to describe the sampling process than it takes to complete that process. In a couple of minutes, the program can take a sample, determine a signaling rate and print out a stream of digital data. After this quick work comes the time-consuming task of attempting to interpret the sample.

Digibit 1.0 provides a number of features that make data interpretation easy. After a sample is taken, it can be displayed many times, either as a digital bit stream at various signaling rates or as mark and space pulse widths. When the digital data is being printed, any number of bits can be printed per line. The program allows the user to examine the data thoroughly.

The ability to display a variable number of bits on a line can help determine the number of bits per character in the received data. When the data is displayed with the number of bits/line equal to the number of bits/character, patterns appear in columns — start or stop bits occur in the same column on each line (Table 4[A]). If the data is printed out with one too few bits/line, diagonal patterns appear going from the upper left to the lower right, as start and stop bits precess across the printed lines (Table 4[B]). If the data is printed out with one too many bits/line, the diagonal patterns run from upper right to lower left (Table 4[C]). While this is not a flawless way to determine character length, it works in many cases. Concentrate the search between 5 and 10 bits/character, since this range includes the common character lengths.

RTTY stop bits, indicating the ends of characters, are often longer than data bits. Because these stop bits cannot be divided evenly by the bit period, Digibit 1.0 will sometimes display them as "?" rather than as ones or zeros. The periodic "?"'s in a Digibit 1.0 printout might be the stop bits in the received code, and can help identify character length and transmission speed.

Synchronous transmissions, without stop bits, still must have some indication of the beginning and end of transmissions. Look for repeated bit sequences (called flags) in your printout. Amateurs using AX.25 packet radio techniques use a series of at

Table 5
Program Listing for Apple II Version of Digibit 1.0

Basic Program

```
0 REM
-----
      LDDP LINES 2-28 MOVED TO LOW
      LINE NUMBERS TO EXECUTE FASTER.
-----
1 GOTO 190
2 GOSUB 9030
3 REM
-----
      MACHINE LANG. INITIALIZATION.
-----
4 CALL 38201
5 REM
-----
      RESET MACH. LANG. COUNTR AND
      POINTERS ON THE ZERO PAGE.
-----
6 POKE 825,0
8 POKE 251,1: POKE 252,64
9 REM
-----
      IF "BIT"=0 THEN SAMPLE WAS A
      SPACE. IF "BIT"=1 THEN SAMPLE
      WAS A MARK.
-----
10 BIT = PEEK (822)
11 REM
-----
      ROUTINE AT 37983 RETURNS # OF
      SAMPLES BETWEEN MARK/SPACE
      TRANSITIONS. VALUES RETURNED
      AT 824 AND 823.
-----
12 CALL 37983
14 M = M + 1
15 REM
-----
      THERE SHOULD BE FEWER THAN 3000
      TRANSITIONS.
-----
16 IF M = 2999 GOTO 560
17 REM
-----
      (HIGH BYTE*256)+LOW BYTE=SAMPLE
      DURATION.
-----
18 WIDTRX(M) = PEEK (823) + PEEK
      (824) * 256
19 REM
-----
      SAMPLES LONGER THAN 32767
      INDICATE SAMPLE OVERFLOW.
-----
20 IF WIDTRX(M) > 32767 THEN GOTO
      3000
21 REM
-----
      IF FIRST SAMPLE DURATION=0 THEN
      SAMPLING ERROR.
-----
22 IF WIDTRX(M) = 0 AND M = 0 THEN
      GOTO 2000
23 REM
-----
      SPACE SAMPLES WILL GET NEGATIVE
      VALUE IN "WIDTRX()".
-----
24 IF BIT = 0 THEN WIDTRX(M) =
      WIDTRX(M) * - 1
25 REM
-----
      FINAL SAMPLE IS SET TO ZERO
      DURATION BY MACH. LANG. ROUTINE
      CAUSING EXIT FROM THIS LOOP.
-----
26 IF ABS (WIDTRX(M)) > 0 GOTO
      10
```

```
28 GOTO 560
185 REM
-----
MAKE ROOM FOR MACH. LANG.
ROUTINES.
-----
190 HIMEM = 37800
192 REM
-----
VARIABLES: RT=SAMPLES/SECOND;
WIDTRX()=ARRAY OF MARK/SPACE
DURATIONS (+ VALUES ARE MARKS).
```

```
200 DIM WIDTRX(3000)
205 RT = 3971.88
210 GOSUB 10800: REM LOAD MACH.
LANG.
220 GOSUB 10100
230 SPEED = 150
235 REM
*****
LINES 240-320 PRINT THE TITLE.
*****
```

```
240 GOSUB 10200:V = 8: GOSUB 105
00:H = 12: GOSUB 10400: PRINT
"
"
250 V = 9: GOSUB 10500:H = 12: GOSUB
10400: PRINT " DIGIBIT 1.0 "
```

```
260 V = 10: GOSUB 10500:H = 12: GOSUB
10400: PRINT "
"
: GOSUB 10300
270 V = 14: GOSUB 10500: PRINT "
BY"
280 V = 16: GOSUB 10500: PRINT "
RUSSELL S. HAMILTON"
290 V = 18: GOSUB 10500: PRINT "
K3RH"
```

```
300 V = 23: GOSUB 10500:H = 25: GOSUB
10400: PRINT "NOVEMBER, 1983
"
```

```
310 SPEED = 255
320 FOR I = 1 TO 2000: NEXT
330 REM
*****
LINES 340-370 INITIALIZE VARS.
*****
```

```
340 PLF = 0:PS = 0:MM = 0
350 JA = 0:PR = 0:PT = 0
360 PU = 0
370 DE = -1000:DF = 0:DG = 0:GG
= 0
375 REM
```

GET TIME/DATE/FREQ. DATA.

```
380 GOSUB 10100: GOSUB 4000
390 M = -1:LF = 0
400 DD = 1000:JJ = 0
410 HGR2: REM WATCH SAMPLES ST
ORED.
415 REM
```

MACH. LANG. ROUTINE AT 37888
LOADS BIT SAMPLES BETWEEN #4000
AND #7FFF.

```
420 CALL 37888
425 REM
```

PUT MARK/SPACE WIDTHS INTO
WIDTRX() ARRAY.

```
430 GOTO 2
560 TEXT
565 REM
```

GO TO THE RESULT MENU.

```
570 GOSUB 5000
580 REM
*****
LDDP FROM 590-710 FINDS MINIMUM
MARK/SPACE DURATIONS, AND
PRINTS SOME.
*****
```

```
590 MM = 200
600 IF M - 1 < MM THEN MM = M -
1
```

```
610 FOR I = 1 TO MM
620 AC = WIDTRX(I)
630 IF AC < 0 GOTO 650
640 IF AC < 0 GOTO 670
650 IF AC < DD THEN DD = AC
660 GOTO 680
670 IF AC > DE THEN DE = AC
680 PRINT " ";WIDTRX(I);
690 PS = PS + 1
700 IF PS = 14 THEN PRINT CHR#
(13);PS = 0
710 NEXT
715 REM
```

PRINT MIN. MARK/SPACE DURATIONS
AND AVERAGE MINIMUM DURATION.

```
720 PRINT : IF M - 1 = 0 GOTO 20
00
730 PRINT : PRINT "MINIMUM BITWI
DTH COUNTS ARE:"
740 PRINT " ONE (1): "; GOSUB
10200: PRINT DD; GOSUB 1030
0: PRINT " ZERO (0): "; GOSUB
10200: PRINT DE: GOSUB 10300
```

```
750 DF = (DD + ABS(DE)) / 2
760 PRINT "AVERAGE MINIMUM BITWI
DTH = "; GOSUB 10200: PRINT
DF; GOSUB 10300: PRINT " CO
UNTS."
765 REM
```

CALL SUBROUTINE TO CALC. BAUDS
BASED ON AVG. MINIMUM DURATION.

```
770 GOSUB 9000
775 REM
```

PRINT CALCULATED BAUDS AND SET
TEXT WINDOW TO LOWER HALF OF
SCREEN.

```
780 PRINT "DATA SIGNALING RATE="
"; GOSUB 10200: PRINT DD; GOSUB
10300: PRINT " BAUD."
790 PRINT :ST = 23: GOSUB 10900
800 GOSUB 6000: REM CALL TEST M
ENU
```

```
810 GOSUB 8000: REM CALL PRINTE
R SET UP
820 REM
```

LOOP 830-970 CALCULATES AND
PRINTS DATA BITS AS OUTLINED IN
TEXT.

```
830 FOR JJ = 1 TO M - 1
840 DIGITS = ABS(WIDTRX(JJ)) /
DF
850 DIGITS% = INT(DIGITS)
860 ER = DIGITS - DIGITS%
870 IF ER > .7 THEN DIGITS% = DI
GITS% + 1
```

```
880 FOR KK = 1 TO DIGITS%
890 IF WIDTRX(JJ) < 0 THEN BTVL
% = 1
900 IF WIDTRX(JJ) < 0 THEN BTVL
% = 0
910 IF ER > .7 GOTO 930
920 IF ER > .42 THEN PRINT "?";
: GOTO 940
930 PRINT BTVL%;
935 REM
```

"PLF" COUNTS THE CHARACTRS ON
THE CURRENT PRINTER LINE.

```
940 PLF = PLF + 1
945 REM
```

AFTER "WID" CHARACTERS, START A
NEW LINE.

```
950 IF PLF = WID THEN PRINT CHR#
(13);PLF = 0
955 GOSUB 10700: IF KP = 1 THEN
GOTO 990: REM ABORT PRINT
IF KEY IS PRESSED
960 NEXT KK
970 NEXT JJ
980 IF PR = 0 AND PT = 0 THEN PRINT
```

```
: PRINT : GOSUB 10200: PRINT
"PRESS (RETURN) TO CONTINUE"
; GOSUB 10300: GET N#
985 REM
```

CLEAR SCREEN AND CALL MENU.

```
990 GOSUB 10100: GOTO 7000
995 REM
*****
END OF MAIN PROGRAM--BEGINNING
OF SUBROUTINES.
*****
```

```
1000 END
2000 REM
*****
NO DATA ERROR--EQUIPMENT
MALFUNCTION.
*****
```

```
2010 GOSUB 10100: GOSUB 10600
2020 V = 1: GOSUB 10500: PRINT "--
TROUBLE REPORT--
"
```

```
2030 V = 10: GOSUB 10500: PRINT "
NO DATA INPUT. CHECK FOR SI
GNAL LOSS."
2040 V = 11: GOSUB 10500: PRINT "
OR EQUIPMENT MALFUNCTION."
```

```
2050 V = 16: GOSUB 10500:H = 10: GOSUB
10400: PRINT "THIS TEST SUSP
ENDED."
2060 V = 23: GOSUB 10500: INPUT "
PRESS (RETURN) WHEN READY TO
CONTINUE. ";TT#
```

```
2070 IF TT# = "" THEN GOSUB 101
00: GOTO 340
2080 IF TT# < > "" THEN GOSUB
10600: GOTO 2060
2090 ST = 0: GOSUB 10900
3000 REM
```

SAMPLE OVERFLOW ERROR.

```
3010 GOSUB 10100: GOSUB 10600
3020 V = 1: GOSUB 10500: PRINT "--
TROUBLE REPORT--
"
```

```
3030 V = 10: GOSUB 10500:H = 2: GOSUB
10400: PRINT "EXCESSIVE BIT
COUNT. CHECK FOR LOSS"
3040 V = 11: GOSUB 10500:H = 2: GOSUB
10400: PRINT "OF DATA, OR EQ
UIPMENT MALFUNCTION."
```

```
3050 V = 16: GOSUB 10500:H = 10: GOSUB
10400: PRINT "THIS TEST SUSP
ENDED."
3060 V = 23: GOSUB 10500: INPUT "
PRESS (RETURN) WHEN READY TO
CONTINUE. ";P#
```

```
3070 IF P# = "" THEN GOTO 340
3080 IF P# < > "" THEN GOSUB 1
0600: GOTO 3060
4000 REM
```

SETUP ROUTINE.

```
4010 V = 22: GOSUB 10500: PRINT "
"
```

```
4020 V = 23: GOSUB 10500: PRINT "
INSTRUCTIONS: ENTER DATA.
TO REUSE"
4030 V = 24: GOSUB 10500: PRINT "
DATA, SIMPLY PRESS THE (RETU
RN) KEY. ";
```

```
4040 POKE 35,21
4050 GOSUB 10100: PRINT "-----
TEST SETUP-----
"
```

```
4060 V = 4: GOSUB 10500: PRINT "E
NTER DATE (MM/DD/YY): ";B#
```

```
4070 V = 4: GOSUB 10500:H = 24: GOSUB
10400: INPUT " ";BB#
4080 IF BB# < > "" THEN B# = BB
#
```

```
4090 IF BB# = "" THEN V = 4: GOSUB
10500:H = 24: GOSUB 10400: PRINT
B#
```

```
4100 V = 6: GOSUB 10500: PRINT "E
NTER LOCAL '24HR' TIME (HHMM
)"; ;C#
```

```
4110 V = 6: GOSUB 10500:H = 33: GOSUB
10400: INPUT " ";CC#
```

```

4120 IF CC# < > "" THEN C# = CC
#
4130 IF CC# = "" THEN V = 6: GOSUB
10500:H = 33: GOSUB 10400: PRINT
C#
4140 V = 8: GOSUB 10500: PRINT "E
NTER FREQUENCY IN KHZ: ";E#
4150 V = 9: GOSUB 10500:H = 25: GOSUB
10400: INPUT "":E#
4160 IF EE# < > "" THEN E# = EE
#
4170 IF EE# = "" THEN V = 8: GOSUB
10500:H = 25: GOSUB 10400: PRINT
E#
4180 V = 12: GOSUB 10500: PRINT "
WANT TO CHANGE ANYTHING HERE
(Y/N)?": N#
4190 V = 12: GOSUB 10500:H = 38: GOSUB
10400: INPUT "":F#
4200 IF F# = "N" THEN GOTO 4230
4210 IF F# < > "Y" AND F# < >
"" THEN GOSUB 10600: GOTO 4
180
4220 IF F# = "Y" THEN GOTO 4000
4230 V = 12: GOSUB 10500: GOSUB 1
0200: INPUT "PRESS (RETURN)
KEY FOR NEW DATA SAMPLE.":G#
: GOSUB 10300
4240 POKE 35,23: RETURN
5000 REM
*****
SAMPLE COMPLETE ROUTINE.
*****
5010 GOSUB 10100
5020 V = 1: GOSUB 10500: PRINT "--
-----TEST RESULTS-----
"
5030 V = 3: GOSUB 10500: PRINT "S
AMPLING PROCESS IS COMPLETE.
"
5040 V = 4: GOSUB 10500: GOSUB 10
200: PRINT M -- 1: GOSUB 103
00: PRINT " DATA TRANSITIONS
WERE STORED."
5050 V = 5: GOSUB 10500: PRINT "A
N ABBREVIATED LISTING FOLLO
W S:"
5060 V = 6: GOSUB 10500: PRINT "
(NO SIGN:DATA="1". MINUS SI
GN:DATA="0")
5070 PRINT :ST = 7: GOSUB 10900
5080 RETURN
6000 REM
*****
TEST RESULTS MENU ROUTINE.
*****
6005 REM

```

ABORT?

```

6010 V = 24: GOSUB 10500: PRINT "
WANT TO ABORT THIS TEST RUN
(Y/N)?": N#
6020 V = 24: GOSUB 10500:H = 37: GOSUB
10400: INPUT "":H#
6030 IF H# = "N" THEN GOTO 6060
6040 IF H# < > "Y" AND H# < >
"" THEN GOSUB 10600: GOTO 6
010
6050 IF H# = "Y" THEN ST = 0: GOSUB
10900: GOSUB 10100: GOTO 380
6055 REM

```

PRINT SAMPLE DURATIONS?

```

6060 V = 24: GOSUB 10500: PRINT "
WANT TO PRINT ANY DATA COUNT
S (Y/N)?": N#
6070 V = 24: GOSUB 10500:H = 39: GOSUB
10400: INPUT "":I#
6080 IF I# = "N" THEN GOTO 6120
6090 IF I# < > "Y" AND I# < >
"" THEN GOSUB 10600: GOTO 6
060
6100 IF I# = "Y" THEN V = 24: GOSUB
10500: PRINT "HOW MANY?": ;M
- 1: V = 24: GOSUB 10500:H =
12: GOSUB 10400: INPUT "":J#
:PR = 1: IF J# = "" THEN JA =
M - 1

```

```

6110 IF I# = "Y" AND J# < > "" THEN
JA = VAL (J#)
6120 IF I# = "N" THEN PR = 0
6130 IF I# = "" THEN PR = 0
6135 REM

```

PRINT BITS?

```

6140 V = 24: GOSUB 10500: PRINT "
WANT TO PRINT DIGITAL DATA (
Y/N)?": Y#
6150 V = 24: GOSUB 10500:H = 36: GOSUB
10400: INPUT "":K#
6160 IF K# = "Y" THEN PT = 1: GOTO
6200
6170 IF K# < > "N" AND K# < >
"" THEN GOSUB 10600: GOTO 6
140
6180 IF K# = "" THEN PT = 1
6190 IF K# = "N" THEN PT = 0
6195 REM

```

CHANGE BIT DURATION?

```

6200 V = 24: GOSUB 10500: PRINT "
CHG. AVG. MIN. BITWIDTH COUN
T (Y/N)?": N#
6210 V = 24: GOSUB 10500:H = 39: GOSUB
10400: INPUT "":L#
6220 IF L# = "N" THEN GOTO 6280
6230 IF L# < > "Y" AND L# < >
"" THEN GOSUB 10600: GOTO 6
200
6240 IF L# = "" THEN GOTO 6280
6250 V = 24: GOSUB 10500: INPUT "
ENTER NEW MIN. BITWIDTH COUN
T: ";GG
6260 DF = GG
6270 REM

```

CHANGE TRANSMISSION RATE?

```

6280 V = 24: GOSUB 10500: PRINT "
SPECIFY NEW BAUD RATE?: N#
6290 V = 24: GOSUB 10500:H = 25: GOSUB
10400: INPUT "":K#
6300 IF K# = "Y" THEN GOTO 6330
6310 IF K# = "" OR K# = "N" THEN
GOTO 6405
6320 GOSUB 10600: GOTO 6280
6330 V = 24: GOSUB 10500: PRINT "
ENTER BAUD RATE: ";RT / DF;
6340 V = 24: GOSUB 10500:H = 18: GOSUB
10400: INPUT "":DG:DF = RT /
DG
6400 REM

```

HOW MANY BITS/LINE?

```

6405 V = 24: GOSUB 10500: PRINT "
HOW MANY BITS/PRINTED LINE?:
80"
6410 V = 24: GOSUB 10500:H = 29: GOSUB
10400: INPUT "":W#: IF W# =
"" THEN W# = "80"
6415 WID = VAL (W#)
6420 ST = 0: GOSUB 10900
6425 RETURN
7000 REM
*****
SAMPLE/DISPLAY MENU.
*****

```

```

7010 PRINT : PRINT : PRINT : PRINT
: PRINT
7020 GOSUB 11100
7030 GOSUB 10100: PRINT "-----
-----TEST COMPLETED-----
"
7040 V = 4: GOSUB 10500: PRINT "W
HAT FURTHER ACTION DO YOU DE
SIRE?"
7050 V = 7: GOSUB 10500: PRINT "
PRESS (N) FOR NEW SAMPLE."
7060 V = 9: GOSUB 10500: PRINT "
PRESS (R) TO REUSE EXISTIN
G DATA."
7070 V = 11: GOSUB 10500: PRINT "
PRESS (Q) TO QUIT."
7080 V = 24: GOSUB 10500: GET M#
7090 IF M# < > "N" AND M# < >

```

```

"R" AND M# < > "Q" THEN GOSUB
10600: GOTO 7030
7100 IF M# = "N" THEN GOTO 340
7110 IF M# = "R" THEN PLF = 0: P6
= 0: GOTO 570
7120 IF M# = "Q" THEN GOSUB 101

```

00: END

8000 REM

PRINT HEADER SUBROUTINE.

```

8010 IF PR = 0 AND PT = 0 THEN GOSUB
10100: RETURN
8020 GOSUB 11000
8030 PRINT : PRINT : PRINT
8040 PRINT B#
8050 PRINT C#; " HOURS, LOCAL TIM
E"
8060 PRINT E#; " KHZ"
8070 PRINT
8080 PRINT "DATA SIGNALING RATE
= ";DG; " BAUD."
8090 IF PR = 0 THEN GOTO 8180
8100 PRINT
8110 FOR I = 1 TO JA
8120 PRINT " ";WIDCTR%(I);
8130 PU = PU + 1
8140 IF PU = 14 THEN PRINT CHR#
(13);PU = 0
8150 NEXT
8160 PRINT : PRINT
8170 IF PT = 0 THEN GOSUB 11100
: RETURN
8180 GOSUB 11000
8190 GOSUB 9000
8200 PRINT
8210 PRINT "COMPUTED DIGITAL DAT
A FLOW BASED ON A ";DF; " COU
NT MINIMUM BITWIDTH."
8220 PRINT "THIS CORRESPONDS TO
";DG; " BAUD, AND WILL DIFFER
FROM THE INITIAL BAUD RATE"

```

8230 PRINT "IF YOU CHANGED THE A
VERAGE MINIMUM BIT COUNT FRO
M ITS INITIAL VALUE."

8240 PRINT
8250 RETURN
9000 REM

CALCULATE TRANSMISSION RATE IN
BAUDS. (RT/SAMPLES PER BIT).

9010 DG = RT / DF
9020 RETURN
9030 REM

DISPLAY "BUSY SIGN" TO TELL THE
OPERATOR THAT SAMPLES ARE BEING
TAKEN.

```

9040 TEXT : GOSUB 10100
9050 V = 12: GOSUB 10500:H = 4: GOSUB
10400: PRINT "SAMPLING PROCE
SS IS NOW COMPLETE."
9060 V = 14: GOSUB 10500:H = 4: GOSUB
10400: PRINT "COMPUTER IS PR
OCCESSING THE DATA."
9070 GOSUB 10200

```

9080 V = 17: GOSUB 10500:H = 13: GOSUB
10400: PRINT "PLEASE STAND B
Y."

9090 GOSUB 10300
9100 RETURN
10000 REM

THESE ROUTINES MUST BE
RE-WRITTEN FOR THE PARTICULAR
COMPUTER THAT YOU USE.

10099 REM

SUBROUTINE 10100--CLEAR SCR.N.
AND GO TO HOME POSN.

10100 HOME : RETURN
10199 REM

SUBROUTINE 10200--SET INVERSE
TEXT, OR CHANGE CHAR. COLOR.

10200 INVERSE : RETURN	SUBROUTINE 10600--RING BELL.	10899 REM
10299 REM		
SUBROUTINE 10300--RETURN TO NORMAL TEXT COLOR.		SUBROUTINE 10900--SET TOP OF SCREEN WINDOW TO "ST."
10300 NORMAL : RETURN	10600 CALL 64477: RETURN	10900 POKE 34,ST: RETURN
10399 REM	10699 REM	10999 REM
SUBROUTINE 10400--GO TO HORIZONTAL SCREEN POSN. "H".		SUBROUTINE 11000--TURN ON PRINTER.
10400 HTAB H: RETURN	10700 IF PEEK (~ 16384) > 127 THEN	11000 PRINT CHR# (4);"PR#1": RETURN
10499 REM	POKE ~ 16368,0:KP = 1: RETURN	11099 REM
SUBROUTINE 10500--GO TO VERTICAL SCREEN POSN. "V".		SUBROUTINE 11100--TURN OFF PRINTER.
10500 VTAB V: RETURN	10800 PRINT CHR# (4);"BLOOD SAM	11100 PRINT CHR# (4);"PR#0": RETURN
10599 REM	PLS.OBJ0": RETURN	

Assembly Language Program

```

SOURCE FILE: SAMP.LST
0000: 1 LSI ON
0000: 2 *****
0000: 3 *
0000: 4 * SAMPLES.OBJ0 *
0000: 5 *
0000: 6 * BY *
0000: 7 *
0000: 8 * RUSSELL S. HAMILTON *
0000: 9 *
0000: 10 * -- K3RH -- *
0000: 11 *
0000: 12 * NOVEMBER, 1983 *
0000: 13 *
0000: 14 *****
0000: 15 ORG $4000 ;START OF SAMPLE STORE ROUTINE
----- NEXT OBJECT FILE NAME IS SAMP.LST.OBJ0
0000: 16 ORG $7400
0234: 17 MEM1 EQU $334 ;NO. OF SAMPLES DESIRED
0061: 18 MEM2 EQU $C061 ;SAMPLE INPUT AT "P80"
00FD: 19 MEM4 EQU $00FD ;SAMPLE ARRAY POINTER
0000: 20 LOOPS LDA #FFF ;SET UP FOR 16K BYTE SAMPLE ARRAY
0000: 21 STA #0
0000: 22 STA MEM1+1
0000: 24 ARRSTART LDA #000 ;START SAMPLE ARRAY AT $4000
0000: 25 STA MEM4
0000: 26 LDA #540
0000: 27 STA MEM4+1
0000: 28 LDBYTE STA (MEM4),Y
0000: 29 LDA #000
0000: 30 STA (MEM4),Y
0000: 31 LDX #000
0000: 32 NEXTBIT LDB #000 ;RESET THE BIT COUNTER
0000: 33 DELAY1 DEY ;DELAY BETWEEN SAMPLES
0000: 34 BNE DELAY1
0000: 35 MEM3 EQU $334 ;GET A SAMPLE
0000: 36 CMP #0 ;ASSIGNS A OR 1 VALUE TO SAMPLE
0000: 37 BCC LESS1
0000: 38 BCS EIGHTRI
0000: 39 LESS1 LDA #000
0000: 40 JMP CONT1
0000: 41 EIGHTRI LDA #001
0000: 42 CONT1 LDB #001 ;GET BIT ZERO EQUAL TO SAMPLE
0000: 43 STA (MEM4),Y ;STORE BYTE WITH BIT SAMPLE VALUE
0000: 44 INX ;INCREMENT THE BIT COUNTER
0000: 45 TXA ;EIGHTH BIT OF BYTE USED YET?
0000: 46 CMP #006 ;BYTE NOT USED UP, GET NEXT BIT
0000: 47 BCC CONT2 ;GET NEW BYTE FOR EIGHT MORE SAMPLES
0000: 48 BCS FORT3 ;EQUALIZING DELAY FOR FASTER LOOP
0000: 49 BNE FORT3
0000: 50 CONT2 LDB #009
0000: 51 DELAY2 DEY
0000: 52 BNE DELAY2
0000: 53 LDB #000
0000: 54 LDA (MEM4),Y ;GET PARTIALLY FILLED CURRENT BYTE
0000: 55 ASL A ;MAKE ROOM FOR NEXT SAMPLE BIT
0000: 56 STA (MEM4),Y ;SAVE THE BYTE
0000: 57 JMP NEXTBIT1 ;GET NEXT SAMPLE BIT VALUE
0000: 58 CONT3 INC MEM4 ;INCREMENT POINTER TO NEXT BYTE
0000: 59 BNE CONT4
0000: 60 INC MEM4+1
0000: 61 CONT4 LDA MEM4+1 ;ANY MEMORY FOR MORE SAMPLES LEFT?
0000: 62 CMP #006
0000: 63 BCC CONT5 ;GO GET MORE SAMPLES
0000: 64 BCS DONE1 ;NO MORE ROOM -- DONE
0000: 65 CONT5 LDB #001
0000: 66 BNE RTS ;EXIT TO BASIC EXECUTIVE PROGRAM
0000: 67 BRK ;END OF SAMPLE STORE ROUTINE
0350: 68 TEMPTR EQU $338 ;START OF SAMPLE COUNT ROUTINE
0334: 69 TEMPBIT EQU $33A
0339: 70 BITCTR EQU $339
0337: 71 WIDTHCTR EQU $337
0336: 72 SAMPVAL EQU $336
00FB: 73 SAMPLOC EQU $0FB
0000: 74 START10 LDA #000 ;ZERO OUT COUNTER
0000: 75 STA WIDTHCTR
0000: 76 STA WIDTHCTR+1
0000: 77 LDA BITCTR
0000: 78 BEQ GETRYE ;DID COUNT END WITH BIT OR BYTE?
0000: 79 JSR INCDCTR ;GO TO NEXT BYTE FOR SAMPLES
0000: 80 BITCTR ;GO TO NEXT BIT AND UPDATE COUNTER
0000: 81 CMP #001 ;FIND THE NEXT BIT
0000: 82 BCC NEXTBIT ;HAS IT THE EIGHTH BIT?
0000: 83 LDA #000 ;NO, GET NEXT BIT
0000: 84 STA BITCTR ;YES, RESET BIT COUNTER
0000: 85 JMP INCDTR ;INCREMENT SAMPLE ARRAY POINTER
0000: 86 GETRYE LDB #000 ;GET NEXT BYTE OF EIGHT SAMPLES
0000: 87 LDA ;TEST1 ;BYTE VALUE SAME AS SAMPLE VALUE?
0000: 88 SEC
0000: 89 CONT6 LDB #000
0000: 90 LDA (SAMPLOC),Y
0000: 91 CMP #0FF

```


least six mark/space transitions for a flag. Finding a flag sequence in your sample is another step toward identification of the transmission.

Once you know how many data bits make one character, you will want to determine the transmission code. Because of start and stop bits, 7-bit ASCII and 5-bit Baudot codes may appear to have 9 and 7 bits per character, respectively. ASCII codes may have parity bits, and AMTOR codes maintain a 4:3 ratio of marks to spaces. Keeping these points in mind, a comparison of Digibit 1.0 output to codes published in the ARRL Handbook can lead to identification of the transmission code.

Because of the vast number of possible binary codes available to the high-technology pirate, some Digibit 1.0 samples will not be identified — no matter how hard you try. Still, if you think that you have located a pirate station, Digibit 1.0 output, with an accurate log of transmission frequency, data and time, can help the FCC or AIRS (the ARRL Interference

Reporting System) identify the intruder.

Other Uses

Digibit 1.0 has a number of uses other than intruder identification. Digibit 1.0 pulse-width printouts can show the results of multipath propagation and selective fading on FSK signals. If someone is transmitting at a nonstandard signaling rate, Digibit 1.0 can identify the rate so you can set your communications program correctly. As computers become common in ham shacks, many uses will be found for Digibit 1.0 and similar programs.

Writing the Program

The program listing for the Apple II version of Digibit 1.0 is included here (see Table 5). The comments in the program adequately describe its operation. A listing of Digibit-64 for the Commodore-64 is available from the ARRL for an s.a.s.e.

If you are going to write a Digibit program for some other computer, you should closely study the listed machine language subroutines so you can write similar routines for your computer. The


BASIC executive program was written so that only those routines at line 10,000 and above will need to be customized for each computer.

Using Digibit 1.0

Digibit 1.0 takes input from the Apple PB0 input port. This is the same port used by several commercial communications programs. If you wish to use another port, you will have to alter the machine language program, as noted in the listings.

Running Digibit 1.0 is easy. Simply tune in the desired FSK signal as you normally would, then run Digibit 1.0 instead of your regular communications program. The program prompts will tell you what to do.

Experiment! Have Fun!

Digibit 1.0 will allow you to examine many interesting characteristics of FSK signals. Using, and perhaps modifying, the program will teach you a lot about computers and digital communications. You may even be able to catch a radio pirate! 

New Products

HEIL, LTD. MODEL HCS

□ The HCS is a headset control system designed for use by the active radio amateur. It consists of three components: the BM-10 boom headset, a power supply and an audio amplifier. The BM-10 weighs only 8 oz and is well-suited for use under prolonged operating conditions.¹ It can be used with one or both earphones operational, with or without the boom microphone. A new mic element (the HC-4) is used in the BM-10. It has a 10-dB peak at 2100 Hz and a sharp roll-off of 12 dB/octave at 600 Hz. This ensures maximum "talk power" in pileups.

A dual-channel, 2-W audio amplifier with a two-input mixer can be used in dual-

channel (stereo) or single-channel (monaural) modes. When used in the stereo mode, it allows the audio output of two radios to be fed to separate earphones. An active equalizer is provided so the operator can shape the tonal quality of the incoming audio to reduce the amount of noise heard. An additional output section allows another person (such as a logger) to listen, too. An intercom switch permits the operator to disconnect the audio output of the radios and talk to the other person on

the line. This section can also be used to feed audio to another transmitter.

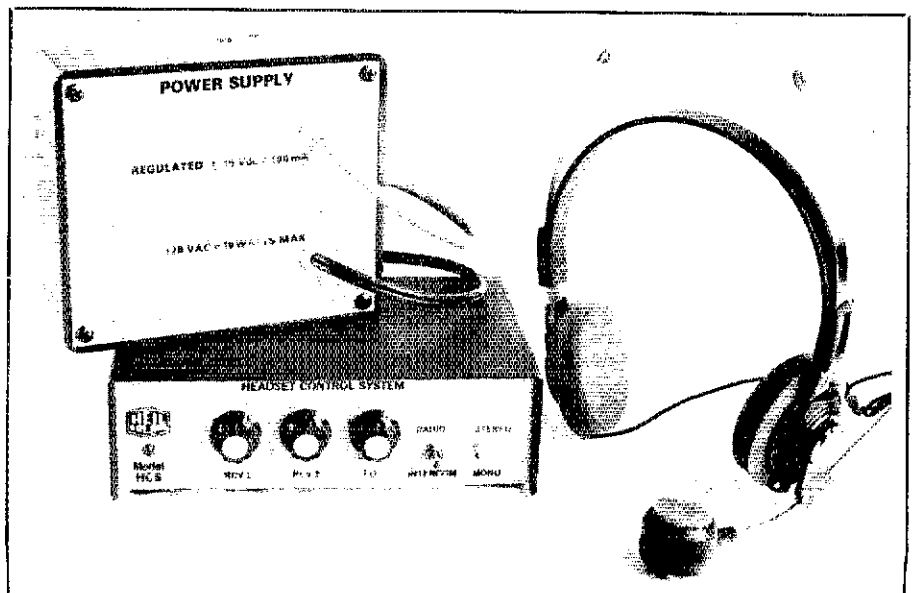
Off-the-air tape recordings can be made by using the back-panel tape recorder output provided. This output is suitable for use in a variety of line-level applications.

System specifications are shown in the accompanying table. The HCS headset control system is available from Heil, Ltd., 2 Heil Dr., Marissa, IL 62257, tel. 618-295-3000. Price class: \$150. — Paul K. Pagel, N1FB

¹g = oz × 28.35

Heil, Ltd. HCS Specifications

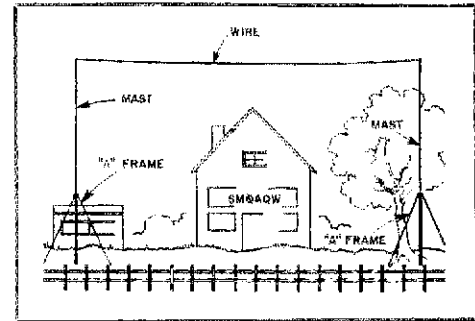
Amplifier: 2-channel, 2-W at 0.15% distortion
 Microphone input: Low-Z, low level.
 Microphone output: 0.01 to 0.5 V with variable control.
 Equalization: ±8 dB at 1500 Hz (on output amplifier only).
 Intercom mic level: +4 dBm into a 16-ohm load (internal gain control).
 Transmit control: Output for PTT switch.
 Tape recorder output: Line level, 1 V.
 Inputs: Two line-level, variable.
 Connectors: Nine ¼-inch input/output jacks.
 Power supply: Input, 117-V ac, 0.5 A; output, ±15-V dc, 0.4 A.
 BM-10: Stereo, 16-ohm headsets; removable earphones.
 Microphone element: Heil HC-4, low-Z; output, -68 dBm from 600 to 3200 Hz.



The Half-Delta Loop Goes Rectangular!

Getting the VE2CV Half-Delta Loop into an urban lot can be a challenge. A rectangular format solved the problem at SMØAQW without impairing his 100-W DX capability.

By Jan Gunmar,* SMØAQW



How to get on 80 meters with 100 W and work DX effectively? Many city dwellers face this perplexing problem, and I was one of them. After being inactive for some 23 years, my return to Amateur Radio showed that the DX was still there, and that as the old saying goes, "What you don't have in your final amplifier you must have in your antenna system and between your ears!"

The conditions for erecting a decent 80-meter antenna on a typical piece of suburban property are seldom favorable. My house stands in the middle of an 82- × 98-foot lot.¹ There are no high trees nearby. Two sides of the lot border the property of neighbors; the third side faces a road; and the remaining boundary line separates my lot from a public playground. Attaching my antenna wires to accessible objects near my property would not be popular with the parents of little Sven or Olle! I had to keep my antenna within my property lines. Added space for radial wires or guy cables might be obtained inconspicuously through the aid of darkness and the natural vegetation.

First Attempts

An inverted V with the apex at 55 feet was tried. It worked well within northern Europe, but DX reception was poor. I dismantled the antenna a day later, after hearing SM and OH friends working VK3MR, who was buried in noise and appeared as a fuzzy whisper in my receiver.

A vertical antenna seemed to be the next choice for me. I tried a "broken vertical" (Fig. 1), which is a Marconi or "inverted L." I used 12 radials that were 23 feet long each. The antenna presented a good load

to the rig from 3.5 to 3.8 MHz while using a simple Transmatch. I observed an improvement in reception compared to that with the inverted V. Signals from intermediate distances (EA, UA6 and UA9) were strong, but the Scandinavian signals were weaker than with the inverted V. Furthermore, this antenna was by far the ugliest one I had ever built!

The Half-Delta Loop Arrives

I read the March 1983 and September 1982 issues of *QST* and was interested in the accounts of W9JJV, VE2CV and WIFB concerning the Half-Delta Loop and its performance. This provided a new idea for me: Why not add a quarter wavelength of wire to my "broken ground plane" and convert it to a half loop? The ground was frozen, but a soft spot existed where my compost heap was situated. At this location I drove an aluminum ski pole into the soil, connected 72 feet of wire between the pole and end point of my vertical, then hoisted the whole system to the top of my TV mast (Fig. 2). There it was — a straggling, swaying half loop. It was uglier looking than my vertical antenna!

I was pleased with the antenna performance during tests. It tuned up easily on all bands, had good bandwidth, and it was a quieter receiving antenna. The DX signals seemed louder than with my vertical.

As I added DX countries to my total, I planned some quality-assurance actions: A more permanent and better looking loop was needed. I later built a pair of A-frame masts from 1½- × 1½-inch pressure-impregnated lumber. Next I added a 34.5-foot piece of TV masting on each support to serve as parts of the radiator. These were insulated from the A-frames by means of glass-fiber laminate that was fastened to wooden blocks. The top ends of the masts were joined by using a 77.1-foot length of galvanized wire. The wire was made electrically common to the masts by means of metal hose clamps. A total loop length of 146 feet was chosen in order to obtain a compromise between 75-80 meters and 40 meters. See title drawing.

A Ground System

I drove a 5-foot ground rod at the base of each A-frame. These rods were joined electrically by a length of insulated wire

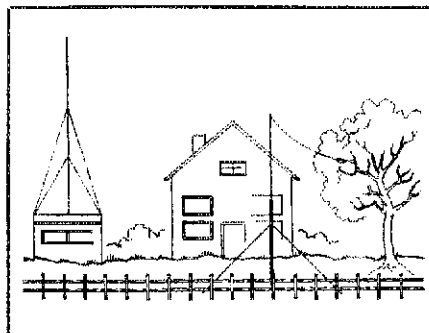


Fig. 1 — First effort at erecting an ugly Marconi. Poor results spelled the demise of this system after one day!

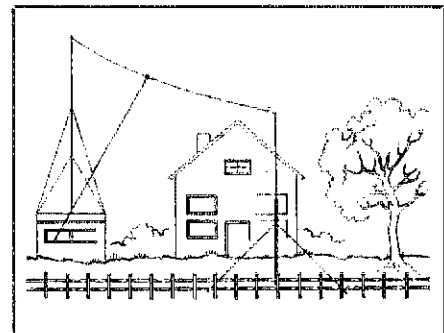


Fig. 2 — A very ugly half-wave rectangular loop evolved from the SMØAQW ugly vertical of Fig. 1. It was a DX-getter, but was flimsy.

¹Notes appear on page 29.

*Ga Ekerövögen 42, 17800 Ekerö, Sweden

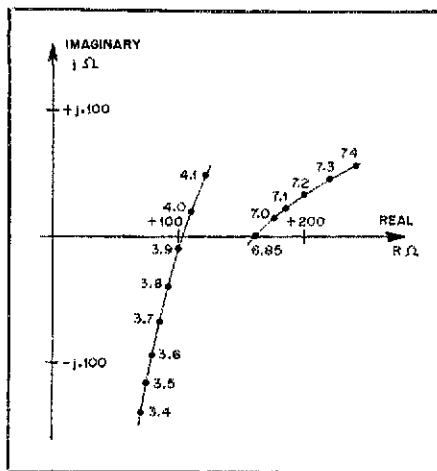


Fig. 3 — Measured impedances of the rectangular loop at 80 and 40 meters.

Table 1
Impedance Values for Fig. 3

Freq. (MHz)	Real (R)	Imaginary (jX)
3.4	71 Ω	-j140
3.5	75 Ω	-j116
3.6	80 Ω	-j95
3.7	86 Ω	-j69
3.8	93 Ω	-j40
3.9	100 Ω	-j10
4.0	112 Ω	+j20
4.1	122 Ω	+j48
6.85	162 Ω	j0
7.0	175 Ω	+j13
7.1	186 Ω	+j23
7.2	200 Ω	+j32
7.3	220 Ω	+j45
7.4	241 Ω	+j54

that I laid on the ground and hid under my fence. A coaxial cable was then connected to the lower end of one of the vertical sections and to the ground rod. The remaining ground rod was attached to the lower end of the other vertical support mast.

Antenna Tests

I found that the settings for my Transmatch were approximately the same as when using the makeshift half-loop antenna. Signals were strong from 80 through 10 meters! Afternoon operation on 80 meters provided good results in Scandinavia. My first "CQ DX" was called at 1930Z on 3503 kHz. My hands trembled with excitement when I was answered by Jim, VK9NS. My first try had been successful!

The following day I tested the loop on 40 meters. During that period and the days that followed, I had QSOs with stations in all continents. Experiments with the antenna on the higher bands indicated that it performed at least as well as my previous monoband antennas.

Subsequent experiences during contests and other operating events during the summer and autumn of 1983 proved that the rectangular half loop is a reliable and effective radiator on 40 and 80 meters. If I can hear them, I can generally work them if the competition isn't too fierce. When a pileup reaches a critical mass, I go away and let the brute-force operators waste themselves!

Some Technical Considerations

The directional properties of the rectangular half-wave loop can be assessed fairly well by modeling the antenna as two verticals fed in phase with quarter-wave spacing on 80 meters, and fed in opposite phase with a half-wave spacing on 40 meters. The horizontal field pattern will be slightly oval on 80 meters, with maximum directivity at right angles to the plane of the loop. On 40 meters, the

Table 2
Impedance Values for Fig. 4

Freq. (MHz)	Real (R)	Imaginary (jX)
13.9	254 Ω	+j51
14.0	287 Ω	+j52
14.1	310 Ω	+j44
14.2	342 Ω	+j30
14.3	370 Ω	+j7
14.4	385 Ω	-j19
17.8	215 Ω	-j45
18.0	228 Ω	-j70
18.2	210 Ω	-j95
18.3	190 Ω	-j100
21.0	200 Ω	-j50
21.3	190 Ω	-j70
21.5	180 Ω	-j90
27.5	278 Ω	-j66
28.0	253 Ω	-j115
28.5	204 Ω	-j137
29.0	169 Ω	-j134
29.5	152 Ω	-j109
30.0	151 Ω	-j69
30.5	165 Ω	-j29

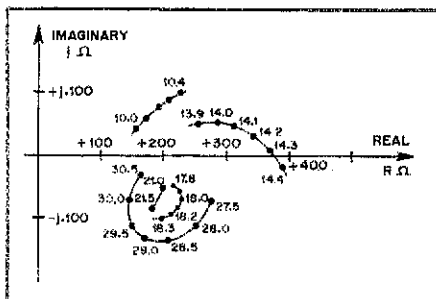


Fig. 4 — Impedance plots for the half loop at 30, 20, 17, 15 and 10 meters.

pattern will be a figure 8 with maximum directivity in the plane of the antenna. I have not observed distinct nulls from my antenna on 40 meters, perhaps because the distance between the vertical parts of my loop are somewhat greater than a half wavelength. By increasing the antenna height and shortening the baseline, a better broadside null should result. On 20 meters, the pattern will contain four major

lobes, but it becomes quite complicated on the 10- and 15-meter bands.

I borrowed an HP8407A network analyzer from my employer, plus an HP8601A oscillator and a frequency counter. With this instrumentation I measured the feed impedance of the loop across seven of the amateur bands. R-X plots for 80 and 40 meters are shown in Fig. 3 and Table 1. Values for 30, 20, 17, 15 and 10 meters are given in Fig. 4 and Table 2.

The curve segments shown in Figs. 3 and 4 are parts of a big multiturn spiral. It was fascinating to see this impedance spiral develop as the oscillator frequency was swept over the entire shortwave range. My figures agreed favorably at full scale with those reported by VE2CV for his 180-400 MHz scaled-down version.

The ratios between the electrical and physical lengths for the rectangular loop agree also with W1FB's results: For 80 meters, the ratio is $k_n = 1.17$ ($f_r = 3.95$ MHz); and for 40 meters, $k_n = 0.98$ ($f_r = 6.85$ MHz). Corresponding values given by VE2CV are 1.15 and 0.99.

Some experiments with the ground system were done while measuring the antenna impedance at 3.95 MHz. An antenna resistance of 122 ohms was noted when using only the two ground rods. With the ground rods joined by a length of insulated wire atop the ground, the resistance decreased to 113 ohms. A further decline to 107 ohms occurred after adding a 70.5-foot counterpoise wire to each rod. A multiradial ground screen around each ground rod would probably reduce the real part of the antenna impedance by 10 ohms or more. The antenna impedance of a full-wave loop in free space would be 120 ohms. The impedance of a half loop over perfectly conducting ground would, therefore, be 60 ohms. In a practical situation, the feed impedance should be approximately 75 ohms.

Matching and Feeding the Loop

The real part of the antenna impedance ranges from 80 ohms at 3.5 MHz to nearly 400 ohms at the high end of 14 MHz. Intermediate values of 150 and 250 ohms will be found for the 40, 30, 17, 15 and 10-meter bands. For a single-band operation, it is possible to resonate the loop at a favored frequency by adding series reactance at the feed point. On 80 meters, an inductance of 3 μ H (+j70 ohms at 3.7 MHz) will make the system resistive at 3.7 MHz. A good match across the band will be had with 75-ohm coaxial feed line. Obtaining a suitable match to coaxial cable across several bands is a difficult problem to solve.

The most practical matching idea is to follow the advice of W1FB and VE2CV: Install a switched L network between the feed line and the loop. Such a system was described in *QST* by W1FB.² It can be in-

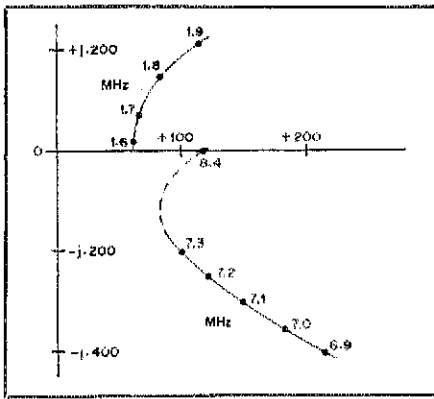


Fig. 5 — Impedances of the half loop at 40 and 160 meters with the far end open.

Table 3
Impedance Values for Fig. 5

Freq. (MHz)	Real (Ω)	Imaginary (jX)
1.6	62	+j16
1.7	66	+j74
1.8	85	+j142
1.9	114	+j212
6.9	214	-j403
7.0	180	-j360
7.1	148	-j304
7.2	122	-j250
7.3	100	-j200
7.4	120	0

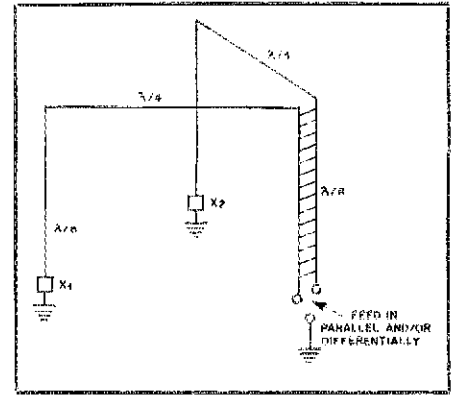


Fig. 8 — A configuration that can be used with parallel or differential feed (see text).

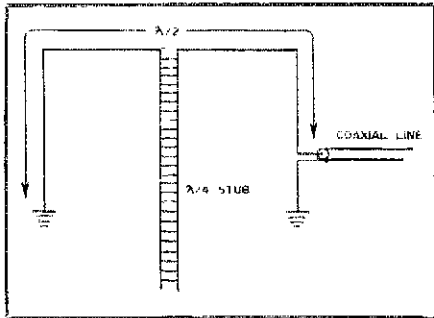


Fig. 6 — A loop variation that uses a 1/4-wave stub (see text).

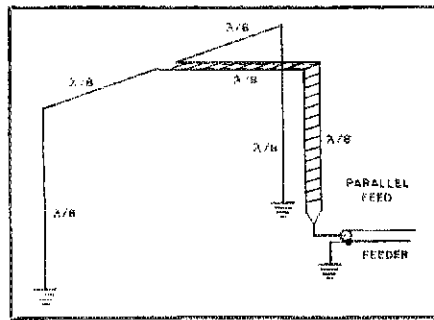


Fig. 7 — Parallel feed of the loop with the stub shorted and used as the feed point (see text).

directivity would be at right angles to the plane of the antenna.

Fig. 5 and Table 3 show the measured feed impedances of the antenna on 40 and 160 meters with this new configuration. The antenna is clearly too long on 160 meters, but we can resonate it by inserting a capacitive reactance of approximately 100 ohms in series with the feed. The system would be too long, also, on 40 meters. I have not tested the antenna on 160 meters, but I'm sure it would work as well as most random-length wires do on that band.

I operate the antenna by using an SPDT relay between the far end of the loop and ground. By this means I can obtain high-angle radiation for daytime use on 80 meters. This increases my signal reports within Sweden by two S units. The same technique at night decreases my signal strength by the same amount.

Variations

One idea I have not tried, but of possible value, is to introduce a quarter-wave stub (open) in the horizontal wire, midway between the vertical portions of the loop (for 80-meter use). See Fig. 6. The currents in the vertical elements will then be of opposite phase. This will cause a horizontal pattern that becomes a figure 8, with the maxima in the plane of the loop and the minima at right angles to the plane.

Operating the antenna on 40 meters in this manner requires that the stub (half wave on 40 meters) be shorted. The vertical antenna sections will then be in antiphase, with primary directivity in the plane of the radiator. Remember that a shorted half-wave stub causes a short circuit!

The use of a quarter-wave stub on 80 meters opens another interesting possibility. Suppose we tie the stub leads together at the formerly open end (lower), then route the stub like an L and feed the antenna between the stub and a third ground rod (center). This configuration will look like that in Fig. 7. There is now a potential for some front-to-back ratio, because we now have three vertical elements. In theory, the two grounded elements could be phased relative to the driven element (center) if we inserted reactances between ground and the outer ver-

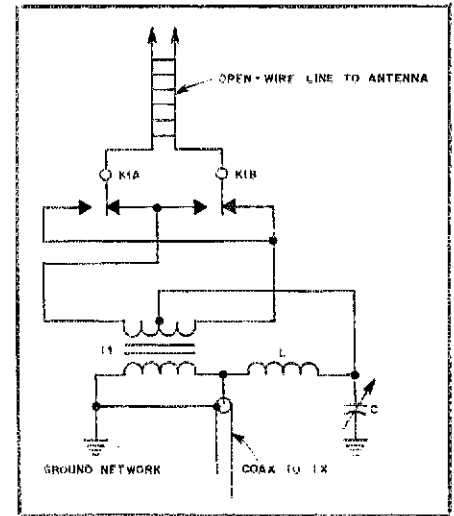


Fig. 9 — Phasing and tuning network for the rectangular loop (see text). K1 is a DPDT relay for direction switching. T1 is a balun transformer with a secondary center tap. Components L and C are for tuning and phasing during parallel excitation.

tical sections. Let's go a step further and remove the stub spreaders from the upper portion and move the driven element outward until the top wires become taut. We would then have an arrangement like that of Fig. 8, where the ground rods are located at the corners of a triangle. This system could be operated in three fundamental modes:

- 1) Apply balanced excitation through the stub, with the feed network being a balun transformer or balanced LC circuit with taps. The outer verticals will be in antiphase.

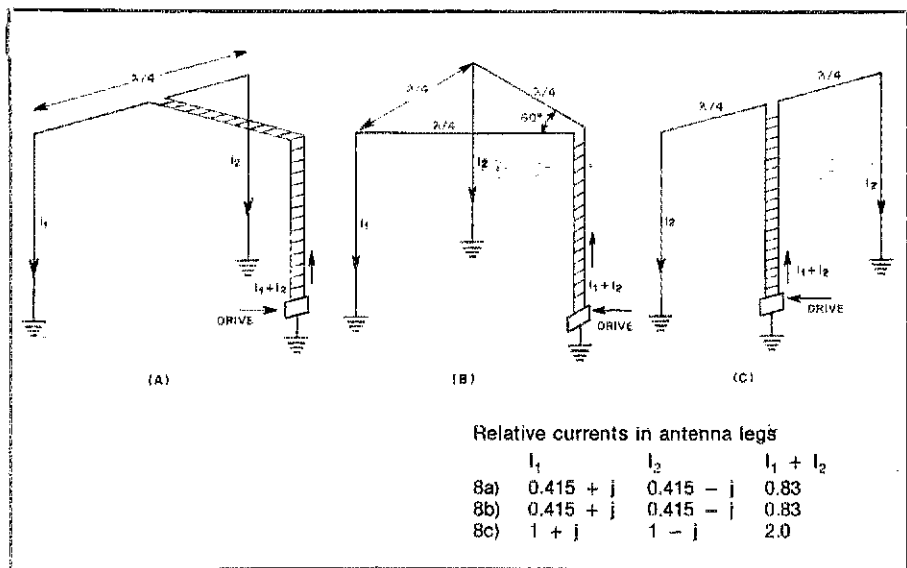
- 2) Tie the stub leads together at the end and apply excitation between the stub and ground, then try phasing the outer elements by inserting reactances X1 and X2.

- 3) Combine the foregoing drive methods by applying individual excitation (phase and amplitude) between each stub lead and ground. A suggested drive network is shown in Fig. 9. I am sure there are many good beam antennas hidden in combina-

stalled in a weatherproof enclosure at the feed point of the antenna.

Opening the Loop

We may wonder what would happen if we were to open the connection at the far end of the loop where it is grounded. A relay could be used for that purpose. On 80 meters, the antenna would become an end-fed half-wavelength wire, just 10 meters above ground. A poor DX antenna, for certain, but useful for local communications. On 160 meters the system would become a quarter loop, and on 40 meters we would have two "coupled verticals" with currents in phase. The pattern would be that of a figure 8, but maximum



Relative currents in antenna legs

	I_1	I_2	$I_1 + I_2$
8a)	$0.415 + j$	$0.415 - j$	0.83
8b)	$0.415 + j$	$0.415 - j$	0.83
8c)	$1 + j$	$1 - j$	2.0

Fig. 10 — For a cardioid pattern, we might adopt one of these configurations. The null or maxima will be in-line with the conductors that carry I_1 and I_2 .

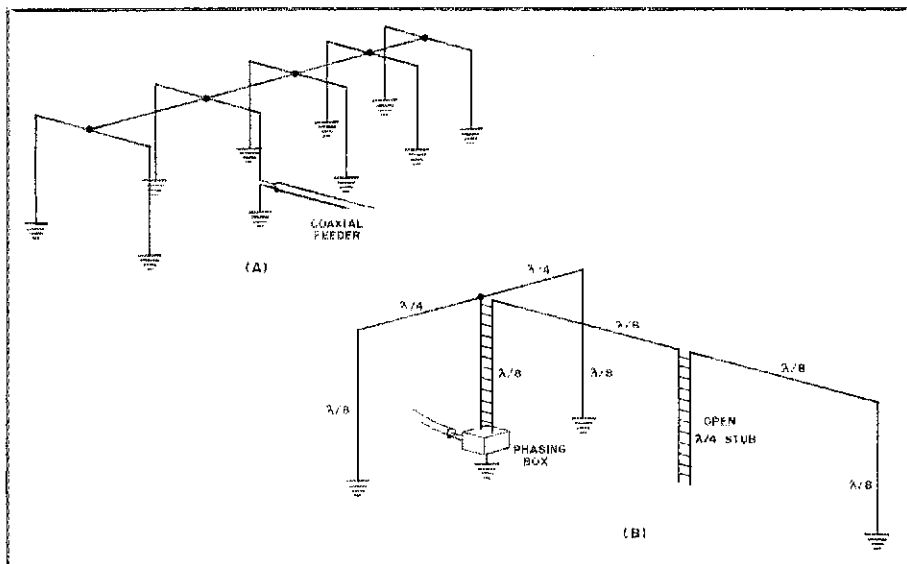


Fig. 11 — Possible improved versions of the rectangular loop. At A is a tunnel or rib-cage multielement half-loop array (see text). The version at B could be called a T-Bone array. These are offered as food for thought.

tions of drive and phasing under items 2 and 3. Fig. 10 illustrates three configurations that should produce a reversible cardioid pattern if the drive network of Fig. 9 is used.

The possibilities appear endless: How about two crossed rectangles fed at the crossover point of the top wires using a two-wire or four-wire line with parallel or differential excitation? Or, how about (wow!) a multielement array of coupled rectangles (Fig. 11)?

Conjecture

In order to be scientific I will state "SM0AQW's conjecture": It is possible to build directive arrays of vertical antennas using top excitation from the driven elements to the other elements in the array.

The array elements may be located in-line or at the corners of a polygon. The phase shifts and amplitudes of the currents in the individual elements, relative to the current in the driven element, may be controlled by inserting reactances between array elements and ground, by inserting 180-degree delay lines ($\lambda/4$ -wave stubs) in the top feed lines and by using a combination of parallel and differential drive. End of conjecture.

A Challenge

Having given this exposition of ideas and results I hope I have inspired some of you experimentally minded brethren to roll out the chicken-wire nets on your lawns, deploy your field-strength meters and do some modeling on 2 or 10 meters. A 10-meter

model will be only 4 feet high, and can be built by using wooden sticks and hookup wire! I also hope some of you computer buffs will brush off your complex-number algorithms and figure out how to get a nice front-to-back ratio on 80 meters while using as few antenna elements as possible! See you at the band edge.

Notes

- ¹m = ft \times 0.3048.
- ²D. DeMaw, "Antenna Matching, Remotely — Some Thoughts," July 1982 QST, p. 14.

Jan Gunnar was born in 1930, and is licensed as SM0AQW. His Amateur Radio career began in 1947, when he was SM5AQW. Jan is the Quality Manager for Ericsson Radio Systems in Stockholm. He is a member of the IEEE and holds an MS (electrical engineering) degree. In his cover letter with this article, he expressed a concern for his rendering of the English language. We found it to be as good as or better than that found in many articles written by U.S. amateurs. He states that with the rectangular loop described here, he had worked 80 DXCC countries on 80 meters with 80 to 100 W of power, during casual operation, between May and November 1983. ☐

Strays

I would like to get in touch with...

- any hams working for a federal, state or local environmental regulatory agency who are interested in forming a weekly net. Louis Devillon, K4ZRP, 1258 Holly Cove Dr., Jupiter, FL 33458.
- anyone having an interest in arachnids, especially the species *tarantula*. B. W. Lafferty, W0UBT, 7131 Logan Ave., N., Brooklyn Center, MN 55430.
- anyone who has a RTTY/ASCII/CW program for a CP/M. Mike Vanhooser, N5ADU, 110 Chelsea Bay, Lewisville, TX 75067.

Next Month in QST

If you're into VHFing, you'll want to know the basics of solid-state power amplifier design. The Beginner's Bench article in August QST provides the theory and a workshop project that will give your 2-meter hand-held rig 15 watts of punch.

Elsewhere in the issue, you'll learn how to spread word of the joys of Amateur Radio to students — even if you've never won any public speaking awards. In addition, look for

- an article on the impressive Amateur Radio exhibit at the World's Fair in New Orleans, and
- a First Steps in Radio installment covering transistors — how they perform several different functions, and how they've evolved into ICs.

Meet the Versatile Diode



Part 7: Diode devices have been with us since the beginning of radio. But in recent years they have taken many new and sophisticated forms that make them useful for a host of applications.

By Doug DeMaw,* W1FB

Let's become acquainted with one of the most commonly used electronic devices — the diode. Diodes have long been used for changing ac to dc voltage (rectifiers), and they have been put to work for many years as *detectors* to convert radio-frequency waves to audio-frequency ones so we might listen to music and conversations that are broadcast through the ether.

Diodes were a vital part of the first radios. Those receivers consisted mainly of a galena-crystal detector (diode) with a "cat's whisker" wire that was adjusted to touch the crystal in a spot that would cause diode action. The radios also used a large coil of wire with tap points for tuning the system to the desired radio-station frequency. We knew them as "crystal sets."

Many an early-day experimenter hunted for hours with the cat's whisker knob in hand, trying to find a "hot spot" on the galena crystal. A truly good hot spot was not only hard to find, but it might never be found a second time! When it was located, the broadcast station would be much louder than when other detector spots on the crystal were used.

No longer must we deal with such crude methods for radio-wave detection. If diodes are used for that purpose, they come in tiny packages with wire leads, and we need only to solder them into our circuit. Many large diodes, designed to accommodate large amounts of current and

voltage, have threaded studs on their cases, making them easy to mount on a heat-conducting surface for cooling purposes.

Fig. 1 shows a number of diode types that are in use today. We can see that it is not always easy to identify a diode by its outward appearance. Many resemble small resistors or capacitors, while others look like transistors. The tip-off for most diodes is that they have but two terminals, whereas other semiconductor or tube devices have three or more terminals.

Whatever type of diode we may use, it is a *passive* component. That means it doesn't require an operating voltage to make it function in a circuit. This is not to say that operating voltage is not applied to some diodes in special instances, for to make specific events take place we must at

times place a voltage on the anode or cathode of a diode. More about that later.

Diode Basics

Fig. 2 shows the symbols for some of the common vacuum-tube diodes that were popular in the "tube era." Although some equipment still contains tube types of diodes, modern apparatus utilizes semiconductor (solid-state) diodes. They are more efficient and much smaller in size. You should be aware, however, of the general format for early-day diodes. The principle of operation was about the same as it is for semiconductor diodes.

Our modern diodes take the general forms illustrated in Fig. 3. Unlike the tube diodes of Fig. 2, there is no heater that must be warmed up for current to flow.

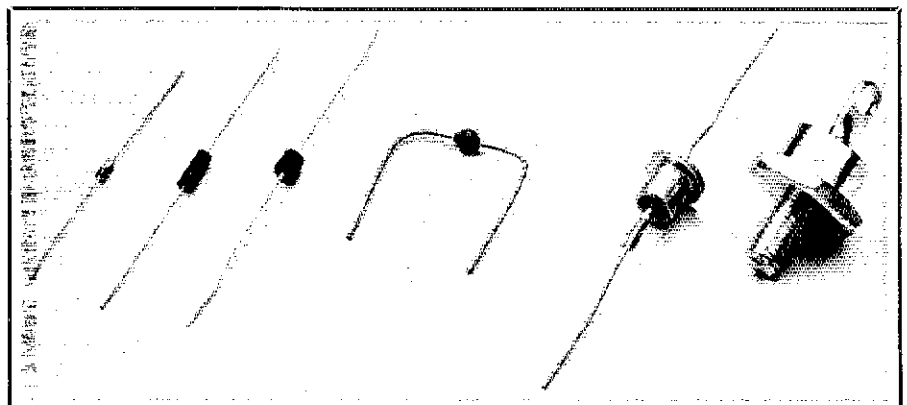


Fig. 1 — Left to right are small-signal diodes, medium-size rectifier diodes and a large stud-mount power diode. Each has one thing in common — it is a two-terminal device that can change ac into dc.

*ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

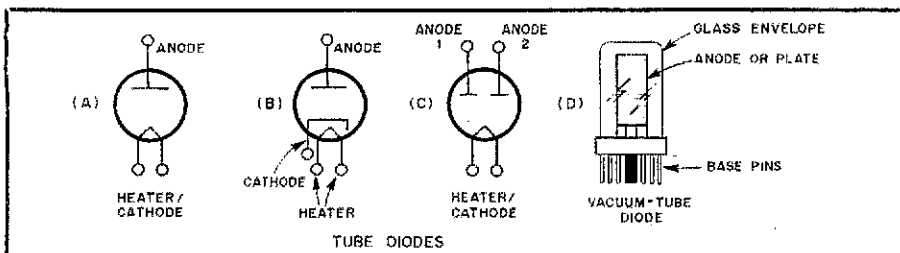


Fig. 2 — Early-day radio circuits used tube-style diodes for converting ac to dc. Although some tube diodes are still in use, they have been replaced for the most part by solid-state diodes.

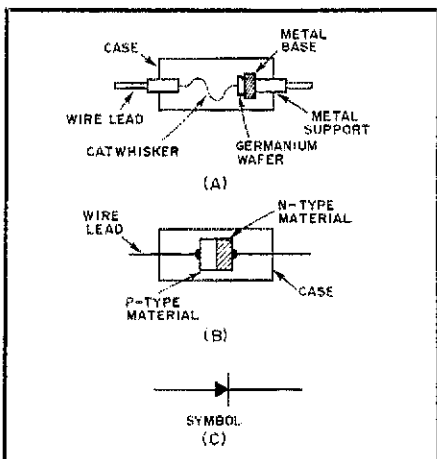


Fig. 3 — The point-contact diode is shown at A. A junction diode is at B, and the standard electrical symbol for a solid-state diode is at C.

The heater also served as the cathode in some tube diodes, while others contained a separate cathode that was warmed up by a heater. There is no warm-up time for a solid-state diode: It begins its function the moment energy is applied to it. Ironically, the galena (and carborundum) crystals of early radios were solid-state diodes, but the concept languished for many years before progress was made. The need for good detector diodes in radar systems served as the springboard for advances in the technology during WW II.

The early type of solid-state diode was the point-contact variety, as shown at Fig. 3A. A tiny wire contacts the germanium material to form the equivalent of a galena crystal and cat's whisker from days gone by. Although point-contact diodes are still available, the major usage is for junction diodes of the kind shown at Fig. 3B. Two types of semiconductor material (P and N) are formed into a sandwich to provide a rectifying junction that will permit diode action. The electrical symbol for a semiconductor diode is presented at Fig. 3C. The end with the arrowhead is the anode, and the part with the single line is the cathode.

There are two fundamental types of semiconductor diode — silicon and germanium. The essential difference is that it takes slightly more applied voltage (roughly 0.7 V) to make the silicon diode conduct

and commence functioning. The majority of our modern diodes contain silicon junction material. The 1N914 small-signal diode is an example of a silicon unit, whereas the almost generic 1N34A small-signal diode is made from germanium material. You will see many circuit examples that call for those two diodes. The approximate conduction or barrier voltage of a germanium diode is 0.3 V, compared to the 0.7 V of a silicon diode. That is, the diode must have at least 0.3 or 0.7 V across it in the correct polarity before current will flow.

How Diodes are Used as Power-Supply Rectifiers

We mentioned earlier that diodes can change ac to dc. Nearly every power supply (exclusive of those that use batteries) contains diodes that serve as rectifiers for changing ac to dc. Let's look at Fig. 4 to see how the diodes might be connected in a circuit to serve our need.

Let's suppose we wanted to develop +12 V for powering a small CW transmitter. We would have to step down the wall-outlet voltage from 117- to 12-V ac. T1 of Fig. 4 would accomplish that. But we still need to change the ac to dc. If we did not rectify the ac voltage, our transmitter signal would have a bad hum on it, caused by the

60-Hz ac wave from the wall outlet or transformer secondary winding. Similarly, we would hear a raucous hum in the speaker if we used an ac voltage to power our receiver.

So, to obtain dc output from our power supply, we will add D1 and D2 of Fig. 4A. The rectifying action of the diodes will change the ac to pulsating dc, and will double the power-line frequency to 120 Hz. Remember, it is 60 Hz to start with. The pulsating dc will still cause hum on our transmitter signal, so we have to take another step in our design. Fig. 4B shows the same circuit, but we have added two filter capacitors (C1 and C2) and a filter choke (L1). These components will smooth the pulses that otherwise could cause hum.

Notice that the dc output now has but a slight ripple. This would be so small that we might not hear it on our transmitter signal or in the speaker of a receiver. We could see the ripple if we connected a sensitive instrument (such as an oscilloscope) to the output dc line. An ideal power supply would have no ripple, and only a straight line would appear on the tube face of a 'scope. These illustrations represent the basis of all power supplies, but some use four diodes in what is called a full-wave bridge circuit. Even a single diode can be used alone to form a half-wave rectifier.

Diodes as Signal Detectors

Let's return to the subject of employing diodes to change RF energy to sound energy (detectors). A diode detector is the simplest form of receiver that we might consider. To illustrate this point, look at Fig. 5. If you doubt the simplicity of the AM radio shown, I urge you to hook one up and give it a try. You will hear the loudest local station, so don't expect to hear the weaker ones (unless the strong one goes off the air).

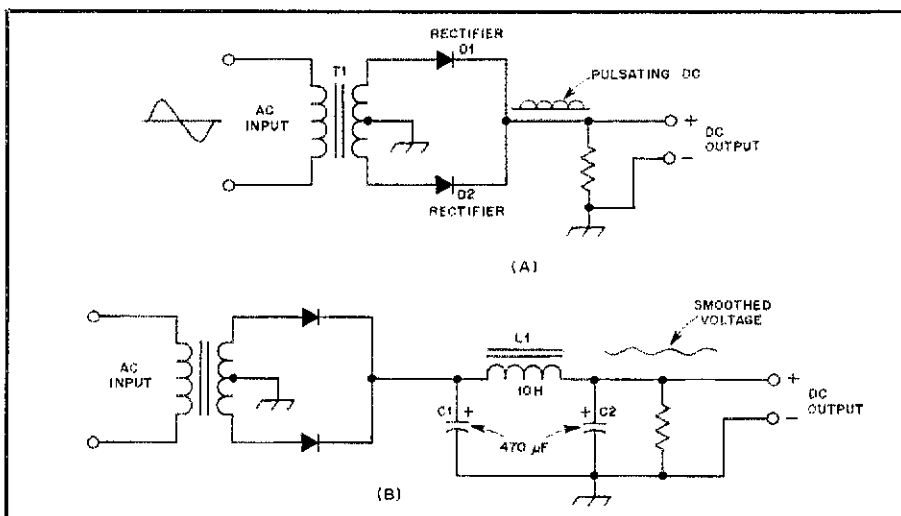


Fig. 4 — Circuit examples of diodes used as power-supply rectifiers. Pulsating dc is shown at the output of the rectifiers at A. A smoothing filter (C1, C2 and L1) has been added to the circuit (B) to minimize unwanted ripple in the dc output of the power supply.

The example of Fig. 5A has only an antenna, a diode detector (D1), a bypass capacitor and a single earphone. The more effective the earth ground and the longer the antenna wire, the louder the sound in the earphone. The circuit of Fig. 5B is a bit more complex, but will provide better performance. The combination of L1 and C1 is tuned to the desired station (you might be able to separate two or three broadcast-band stations this way). Again, the better the antenna and earth ground, the louder the signal response in the phones.

The tuned-circuit receiver is akin to the old crystal sets we mentioned earlier. The diode is coupled to L1 by means of a secondary winding that you can add. Wrap about 30 turns of fine insulated wire over the main coil winding. No. 30 or no. 32 enameled wire is suitable. You may wish to build these receivers as a workshop experiment: It is educational as well as fun.

Diode detectors are used in much more elaborate circuits than those of Fig. 5. They are used as mixers and product detectors in complex high-performance receivers, but those applications are beyond the scope of this series. The ARRL *Radio Amateur's Handbook* contains a wealth of information on that subject; likewise with ARRL's *Solid State Design for the Radio Amateur*.

Basically, here's what happens with a detector diode. It rectifies the incoming RF signal voltage (also ac), converts it to pulsating dc voltage (as in the power-supply example) and causes the headphones to vibrate physically at an audible rate. This is caused by the pulsating dc flowing through the earphones. Simple receivers of this variety were fashioned from razor blades and a wire by U.S. soldiers during WW II. The carborundum in the razor blades would permit diode action for those "fox hole radios."

Other Diode Uses

We can take advantage of the ac-to-dc action of the diode in creating all manner of ham-radio gadgets. For example, we might want to build a field-strength meter for tuning our transmitters or antennas. A circuit that would do the job is shown in Fig. 6. C1 and L1 are chosen to provide resonance at the frequency of interest — say, 3.7 MHz. A short whip antenna (18 to 36 inches will suffice) is attached to the top of L1 to sample the RF energy. D1 rectifies the RF energy picked up by the whip. The pulsating dc (unfiltered) flows through a sensitive meter (M1) and causes the needle to deflect upward when L1 and C1 are tuned to the signal frequency. A strong signal could harm the meter needle by causing it to become bent, so we have added a variable resistor (R1) to control the amount of dc that reaches our meter. This would be known as a sensitivity control.

Note that this circuit is not too different from the one in Fig. 5B. Instead of routing

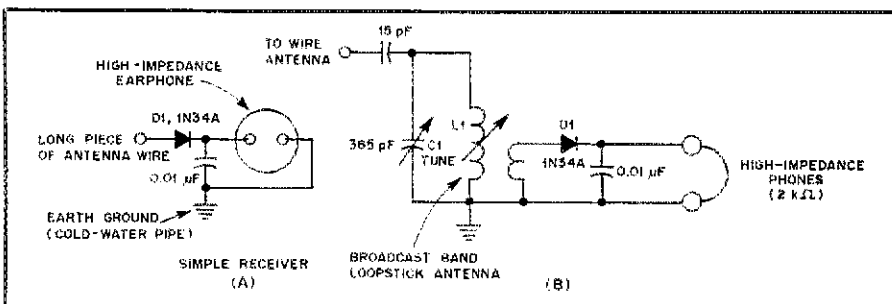


Fig. 5 — Illustration A shows the simplest form of AM receiver we might build. It consists only of a wire antenna, detector diode, capacitor, earphone and earth ground. The circuit at B has a tuned circuit that helps to separate the broadcast-band signals, but otherwise operates in the same manner as that at A.

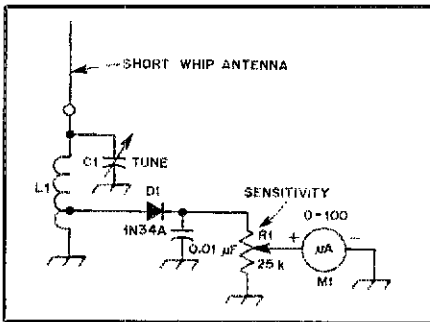


Fig. 6 — A diode detector can be used to sample RF energy. This simple field-strength meter uses rectified RF energy (pulsating dc) to cause the needle of M1 to deflect upward when C1 and L1 are tuned to the frequency of interest. R1 serves as a sensitivity control to prevent strong signals from causing damage to the meter.

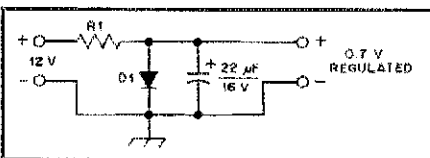


Fig. 7 — We can take advantage of the inherent barrier-voltage characteristic of a diode to provide voltage regulation (see text). R1 is chosen to limit the current through the diode junction, preventing damage to the diode.

the pulsating dc into a pair of earphones, we have sent it to a meter for visual indication. D1 is connected near the grounded end of L1 (about 25% of the total number of turns) so that it will not "load" the coil and cause a broad tuning response when C1 is adjusted.

If you have an amateur license and a transmitter, why not build a field-strength meter and see how it works? You can use one of the broadcast-band ferrite loopstick antennas of Fig. 5 (Radio Shack sells them). Retain the 365-pF variable capacitor and remove turns from the loopstick until you get a meter response at 3.7 MHz when C1 is set at midrange. You don't have to tap the coil as shown in Fig. 6. Instead, add a secondary winding (like in Fig. 5B), but

use only about 15 turns.

Another common use for the diode is as a regulator of dc. See Fig. 7 for a typical circuit. What's happening here? Well, we need a low-level voltage that stays relatively close to the chosen amount, despite changes in load current to the right of the diode. If we use a silicon power diode for D1 (50-V, 1-A diode, for example), it will draw considerable current and provide what is known as a minimum load current. Small changes in the circuit current along the 0.7-V output line will not cause the voltage to drop appreciably. In this circuit we are taking advantage of the diode forward-voltage characteristic, or conduction voltage. You will recall that it is 0.7 V for a silicon diode. We can add diodes in series to raise the value of the regulated voltage, adding 0.7 V per diode. Fortunately for us, special diodes are available for this general application. They are called Zener (rhymes with "keeney") diodes, and they are available for regulation from a few volts to more than 100 V, and at various power levels.

More Applications

Did you know that a simple junction diode can be used in place of a mechanical tuning capacitor? Many diodes are used for that purpose in miniature equipment. In fact, modern TV receivers use tuning diodes in the receiver front end to select the channels. Fig. 8 illustrates how we might use a silicon diode for tuning purposes. When a positive voltage is connected to the cathode of a diode, it acts as a variable capacitor. This is because all diodes have a junction capacitance that changes with the applied voltage.

R2 in our circuit is used to vary the applied voltage, thereby causing changes in the junction capacitance. R1 acts to isolate the tuned circuit from ground so the performance will not be impaired. L1, C1 and D1 are the significant components of the oscillator tuned circuit. Once more we are favored with good fortune, for we can purchase special diodes designed for tuning purposes. They are available under a number of trade names, such as Varicap®

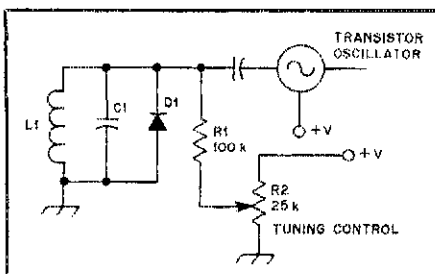


Fig. 8 — Diodes can be used to replace a mechanical variable capacitor in some instances. By applying positive voltage to the diode cathode (reverse bias), the diode internal capacitance can be made to change as the applied voltage is varied. This is an example of a tuning diode, or voltage-variable capacitor (VVC).

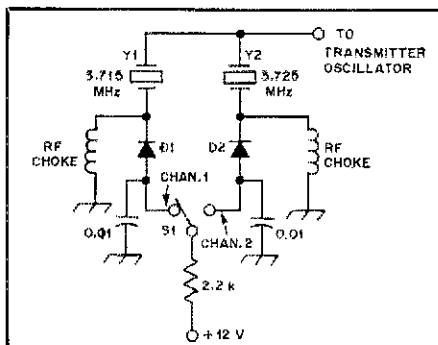


Fig. 9 — Diodes are useful also as electronic switches from dc through RF. This example shows how we might use a pair of switching diodes to select one of two or more frequency channels. When positive voltage is applied to the anode of the diode, it conducts, thereby closing the electronic switch.

and Epicap®. The generic term is *varactor diode*, which means "variable reactance" diode.

Diodes are also used as switching devices. They can be turned off and on by applying voltage and removing it, just as though we operated a mechanical switch in a voltage line. To see how this is done, look at Fig. 9. Switch leads, if long, can ruin the performance of an RF circuit. Therefore, it is convenient to use diodes as dc switches right at the point of interest in an RF circuit. The diodes can be switched by means of dc voltage that is controlled remotely with a mechanical switch (S1 of Fig. 9). When a positive voltage reaches D1 it turns on (conducts), permitting crystal Y1 to "see" a completed path to ground. Meanwhile, D2 is dormant, so Y2 is left floating, so to speak. When the diode conducts, it presents a short circuit for the current to pass through.

If we want to use Channel 2, for example, we simply move S1 to the appropriate position, thus actuating D2 and turning off D1. Diode switches are used in a great many circuits, and they can be used to switch almost any circuit we have in mind. In a similar fashion they can be placed in series with a signal line to act as "gates." When they aren't conducting, the gate is closed.

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Glossary

- clamp — an electrical device that limits the amount of ac voltage to a specified value.
- clipper — an electrical circuit that functions like a clamp to limit the ac voltage level.
- detector — a circuit that changes ac or MF energy into an audio-frequency wave that can be comprehended visually or by the human ear.
- loopstick — a coil wound on a ferrite rod for use as a broadcast-band receiving antenna in small AM radios.
- mixer — a device that combines two ac signals to produce a third frequency, called the intermediate frequency.
- passive — a device that requires no operating voltage to make it function.
- product detector — similar to a mixer except that the output frequency or intermediate frequency is at audio frequency.
- squarer — an electrical circuit that converts sine waves to square waves.
- Zener — a class of diodes with a constant-voltage characteristic that is useful for voltage regulators. Zener diodes are available in a variety of voltages.

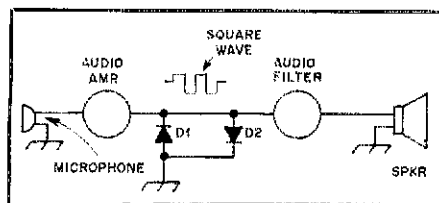


Fig. 10 — It is common practice to take advantage of the barrier voltage of a diode to limit the ac or RF voltage peaks to the barrier-voltage level. This circuit shows how we might use two reverse-connected diodes to clamp or clip the positive and negative audio-voltage peaks (to 0.7 V with silicon diodes, or 0.3 V with germanium diodes). The clipping action causes square waves (harmonics), which can cause audio distortion. A practical circuit would include a smoothing filter immediately after the diodes to restore the audio to a sine wave.

diode scene in this article. There are scores of specialized diodes available for a multitude of uses. Some of the names you will hear are Schottky, IMPATT, PIN, hot-carrier, Gunn, light-emitting (LED), tunnel and solar-electric diodes. There would scarcely be enough page space in a standard-size book to describe all of the diodes and their uses. But as you advance up the technical ladder, you will recognize these special diodes and learn how to use them.

I hope you will take the time to do some additional reading about diodes. If your soldering iron is in good working order, why not pick up a few diodes and tack some circuits together? It will aid you in understanding how diodes work. Nothing beats "learning by doing." □□□

When voltage is applied to them, they switch to the ON mode and the gate is opened to permit passage of the signal voltage.

Diodes can be used also as "clamps." In this type of application, they are placed between a signal line and ground to prevent the signal voltage from exceeding the barrier-voltage level of the diodes. A circuit of this kind is shown in Fig. 10. Unfortunately, the diodes cause the sine-wave audio signal to become distorted (square waves), which can make it sound unpleasant in the speaker. The malady can be corrected by adding an audio filter immediately after the diodes.

Clamping diodes are also called "clippers" or "squarers." When silicon diodes are used in the circuit of Fig. 10, the positive and negative peaks of audio will not exceed 0.7 V. If we desire a higher clamping level, we can place diodes in series at D1 and D2, or we can use low-voltage Zener diodes for D1 and D2.

The Wide World of Diodes

We have not given a broad picture of the

Strays

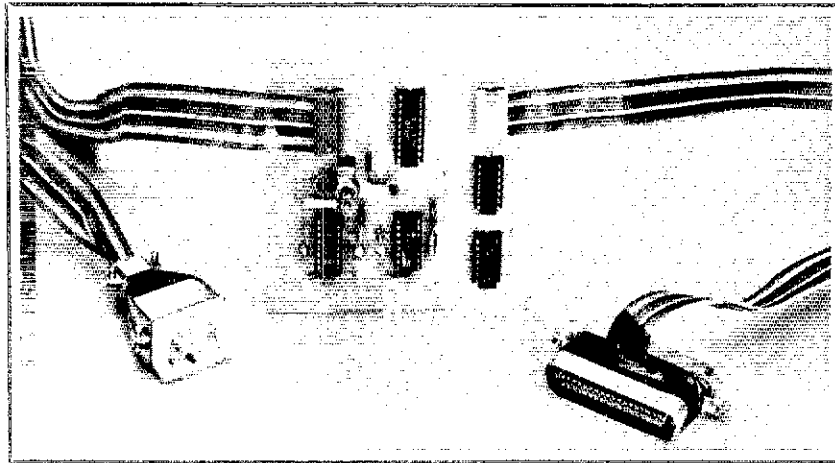
KV4AA — ONE FOR THE RECORD

□ In July 1982 *QST* (p. 19), we reported that Richard C. Spenceley, Sr., KV4AA, of St. Thomas, Virgin Islands, was attempting to work his way into the *Guinness Book of World Records* as the radio amateur with the most QSOs. In the April 1984 edition of that journal, Dick was posthumously awarded the first Amateur Radio entry as the "Most Assiduous Radio Ham." Dick, who died in July 1982, achieved this distinction with a record 48,100 QSOs in 365 days (an average of over 130 a day) in 1978.

NEWSLETTER CONTEST

□ The Amateur Radio News Service (ARNS) is sponsoring a newsletter contest. The deadline for submissions is September 1. Contact Hugh Winter, W5HD, P.O. Box 14812, Albuquerque, NM 87191, for additional information.

Simple, Low-Cost Computer Control for the ICOM IC-720



This adapter will allow you to take advantage of the remote-control features of your IC-720. The circuit will interface the transceiver to your personal computer, and can be built for less than \$40.

By Lawrence Studebaker,* WB9GHU

If you've been wondering how to take advantage of the remote-control features of your ICOM IC-720, here is an interface circuit that provides software control of the transceiver frequency and operating mode. Changing bands or sweeping up or down in frequency is simple. Easy-to-use and understand BASIC "PRINT" commands are all it takes. If you already have a home computer with a Centronics-type parallel printer port, you have everything else required.

Theory of the Interface

Complete information on the ICOM interface specification is available from ICOM America, Inc. so I won't go into great detail here.¹ ICOM uses the same basic specification for other transceivers in their product line. However, while the IC-720 uses 5-V logic, the other transceivers use 15-V logic. This means the interface will work with other ICOM transceivers, but some form of level shifting is required.

The ICOM specification incorporates a bidirectional 4-bit parallel port. For com-

patibility with the Centronics parallel printer port, this controller sends data only from the computer to the transceiver. The computer "knows" the last frequency sent, which should be the current frequency. Hence, there is no need for the transceiver to send data to the computer as long as the frequency is not varied with the tuning knob during computer-controlled opera-

tion. This one-way design greatly simplifies the interface and makes printer-port control possible.

The ICOM rig also incorporates "hand-shaking," in which the transceiver acknowledges only correct data. Unfortunately, this means that the printer port could hang up if an incorrect address were sent. Then a reset would be required. My

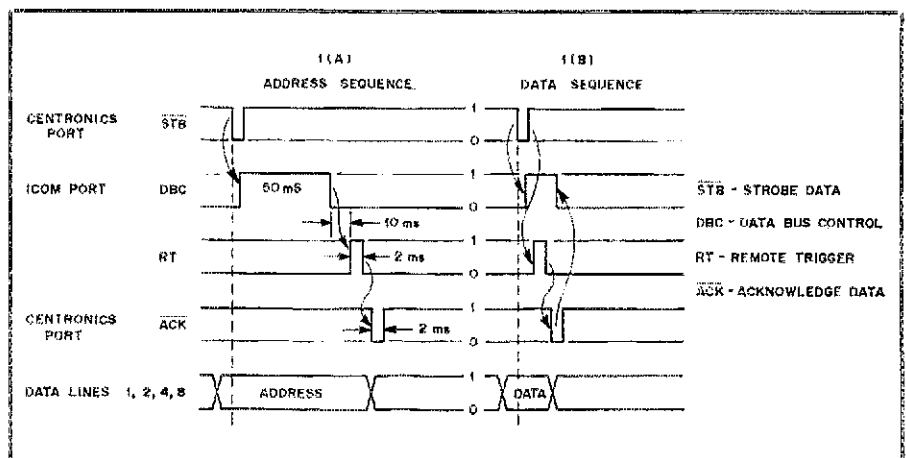


Fig. 1 — These graphs illustrate the timing sequences provided by the interface for address- and data-information signals to the IC-720.

¹Notes appear on page 38.

*1458 Post Ranch Rd., Santa Rosa, CA 95405

controller is designed *not* to handshake with the transceiver, so there is no chance of a hung port because of a computer (or operator) glitch. At the speeds dictated by the ICOM interface, this method has proven completely reliable.

Fig. 1 shows the timing diagram for the two operations required of the interface. When addressing the transceiver, the strobe pulse from the computer printer port initiates a 50-ms data-bus-control (DBC) pulse, followed 10 ms later by a 2-ms remote-trigger (RT) pulse. During this time, the correct address for the IC-720 should be placed on the four data lines. The trailing edge of the RT pulse generates an acknowledge pulse (ACK) for the computer. This sequence is shown in Fig. 1A. Some computers may require a STROBE/BUSY handshake rather than the STROBE/ACK one described here. In this case, an extra IC can be added to the interface circuit.

The IC-720 is now awaiting data for mode, VFO and frequency selection. This data is sent as shown in Fig. 1B. Here, the printer-port strobe pulse again generates the DBC pulse, but it also immediately generates the RT pulse. The trailing edge of the RT pulse generates the acknowledge pulse as before, and the leading edge of the ACK pulse resets DBC.

An address sequence takes about 62 ms, and a data sequence takes about 2 ms. Since a complete operation consists of one address sequence plus eight data sequences (mode, VFO and six digits of frequency data), one complete cycle takes about 80 ms. So, the maximum rate of change is about 12 times a second. The minimum frequency step is 100 Hz, allowing a slew of about 1200 Hz/s. This isn't as good as a scanner, but it is sufficient for sweeping the amateur bands quickly and with adequate resolution.

The parallel printer port sends eight data bits in an ASCII format, and the ICOM standard requires only four bits. The least-significant four bits of the ASCII data are used for the ICOM data lines. The ASCII characters for 0 through 9 will correspond to the binary representation for those numbers (0000 through 1001). The fifth bit is used to determine if the data is to be accompanied by an address sequence or a data sequence on the DBC and RT lines.

If the fifth bit is a 0, the address sequence is sent, while a 1 in that position will cause a data sequence to be sent. This is shown in Table 1. The IC-720 responds to a hexadecimal value E to select a control-address sequence. The interface requires a 0 in the fifth bit place in order to send an address sequence. An ASCII-code table shows the decimal point (.) as one character that will satisfy these conditions. So all commands from the computer to the transceiver begin with a ".". All of the hexadecimal commands for mode and VFO selection are converted into suitable ASCII characters in

Table 1
IC-720 Control Codes

ASCII	ADDR	Binary Data	Hex	Output	Function
Data Bit	5	4 3 2 1			
Decimal Equivalent Place Value	16	8 4 2 1			
.	0	1 1 1 0	E	Select	IC-720 Address
0	1	0 0 0 0	0	USB	
6	1	0 1 1 0	6	CW	
8	1	1 0 0 0	8	AM	Mode
.	1	1 0 1 1	B	LSB	
.	1	1 1 0 0	C	RTTY	
.	1	1 0 1 0	A	VFO A	VFO
.	1	1 0 1 1	B	VFO B	
0	1	0 0 0 0	0	0	
1	1	0 0 0 1	1	1	
2	1	0 0 1 0	2	2	
3	1	0 0 1 1	3	3	
4	1	0 1 0 0	4	4	Frequency
5	1	0 1 0 1	5	5	
6	1	0 1 1 0	6	6	
7	1	0 1 1 1	7	7	
8	1	1 0 0 0	8	8	
9	1	1 0 0 1	9	9	

the same manner. Table 1 summarizes suitable command codes. A complete command from the computer takes the form:

```
10 PRINT ".6;071500"
```

where the "." addresses the IC-720, the "6" sets the mode to CW, the ";" selects VFO B, and the frequency is set to 7.150 MHz.

The ASCII character for a space has the same four least-significant bits as the character for zero; we can send the preceding command using a PRINT USING and an IMAGE statement that leaves space for six digits. If only five digits are sent, the computer will right-justify them and insert a space, which the interface will read as a zero. For example:

```
10 PRINT USING 20;M$,V$,F
```

```
20 IMAGE ".",A,A,6D
```

where M\$ and V\$ are the characters that select mode and VFO, which have been assigned earlier in the program. This is simpler than sending a leading zero.

Circuit Design

With an understanding of what the interface must do, we can take a look at the schematic diagram of Fig. 2 to learn how the circuit operates. The Centronics parallel printer-port data from the computer is latched by the 74374. This IC may not be essential because the data is usually latched by the computer. This is not always true,

however, and the presence of the latch also makes IC-720 data-port damage less likely should incorrect voltages be applied.

The four least-significant bits go straight to the ICOM port. The fifth bit is decoded by U2 to determine whether an address sequence or a data sequence should be sent.

Address Sequence Timing

If bit five is a 0, inverter U3B places a 1 on one input of NAND gate U2B. The STROBE pulse from the computer initiates a timing sequence, as illustrated in Fig. 1A. First the 50-ms DBC pulse is generated at the output of one-shot timer U4A. The trailing edge of this pulse triggers the 10-ms delay of one-shot U4B, and the trailing edge of the delay pulse allows U2B to trigger the RT pulse of U5A and the ACK pulse of U5B. The acknowledge pulse is also tied back to the reset pin of U4A, but the DBC pulse is long gone by the time the acknowledge is sent. The reset just assures a known state. If your computer requires the STROBE/BUSY handshaking you will have to add U7, a 74LS74 dual D flip flop, as shown in Fig. 2. One way to determine if your computer uses the BUSY signal is to disconnect the wire going to pin 11 of the printer connector and see if the printer still works. If it does not, then your computer requires the BUSY signal. My HP-86 computer did not require U7, nor did an Apple IIe and Epson Centronics-type printer card with which I tried the interface. A Radio Shack TRS-80 Model 4 microcomputer did require the extra chip.

Data Sequence Timing

If bit five is a 1, then a 1 is placed on the input to NAND gate U2A. The strobe pulse from the printer will generate the DBC pulse as before, but it will also im-

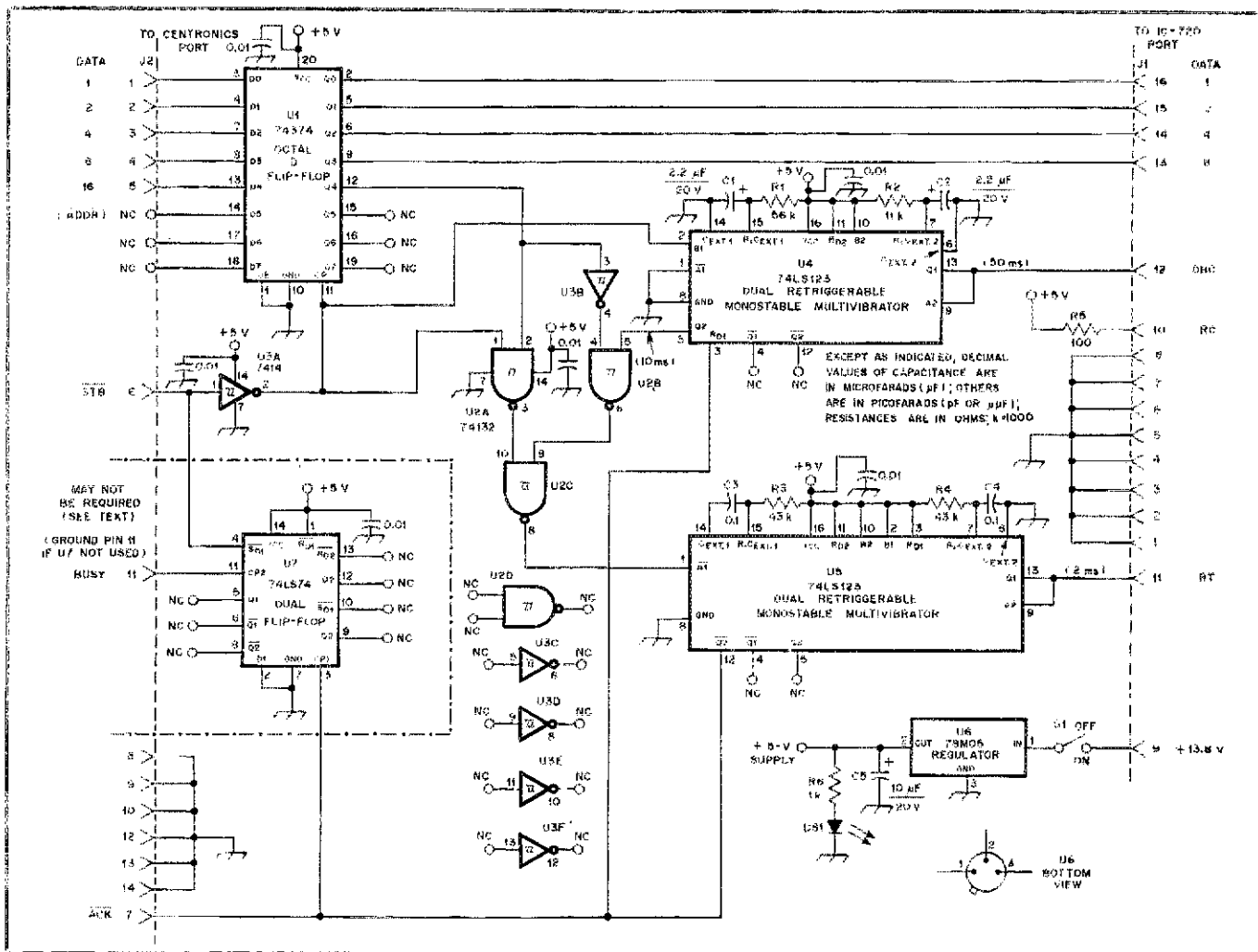


Fig. 2 — A complete schematic diagram of the computer-control interface.

- C1, C2 — 2.2-µF, 20-V, 10%-tolerance tantalum capacitors.
- C3, C4 — 0.1-µF, 35-V, dipped-Mylar® capacitors.
- C5 — 10-µF, 20-V, 10%-tolerance tantalum capacitor.
- J1 — 16-pin DIP socket for ribbon-cable connections to the transceiver.

- J2 — 14-pin DIP socket for ribbon-cable connections to computer.
- P1 — 16-pin DIP plug with ribbon-cable assembly, about 3 feet long (0.9144 meter).
- P2 — 14-pin DIP plug with ribbon-cable assembly, about 3 feet long.
- P3 — 24-pin Molex® connector for accessory socket on IC-720.

- P4 — 36-pin connector or other suitable connector for your computer parallel port.
- U1 — 74374 octal D flip-flop.
- U2 — 74132 quad 2-input Schmitt NAND gate.
- U3 — 7414 Hex Schmitt inverter.
- U4, U5 — 74LS123 dual retriggerable monostable multivibrators.
- U6 — 78M05H 5-V regulator in TO-5 case.

mediately generate the RT pulse, as shown in Fig. 1B. This triggers the acknowledge pulse and resets the DBC timer (U4A) after only 2 ms.

All that remains to place the transceiver in remote control operation, is to tie the IC-720 RC line high. This is done using a 100-Ω resistor connected to +5 V.

Interface Construction

Any of the common construction techniques such as wirewrap, breadboard or PC board should work fine at the low frequencies involved. The 24-pin Molex connector is probably the only part not commonly available. It can be ordered from ICOM America. Just ask for the 24-pin accessory connector for the IC-720. Ribbon cables are used for the I/O lines, with ground between the signal lines. I recommend that you use IC sockets, but they are not required. A single-sided PC-board pattern

for the interface is shown in Fig. 3. The parts-placement diagram, including the five jumpers, is shown in Fig. 4.

Since having PC boards made, I discovered that some computers require U7 to be added to the interface. The voltage regulator, U6, will require a heat sink. The board layout shown does not provide enough room to mount this regulator, so I decided to mount the switch and LED on the foil side of the board. The switch can be secured to the cabinet front panel, as shown in Fig. 5, to help support the circuit board. The red LED indicates when power is applied to the interface.

Fig. 6 shows the wiring of the two ribbon-cable assemblies. The pin numbers for wiring the ribbon-cable connector to the computer correspond to those of a 36-pin connector as is used on most parallel printers. To wire pin 11 to the BUSY signal if your computer requires it, you will have

to cut the trace on the PC board that connects this pin to ground. If your computer uses a different connector, the pin numbers can be determined from the computer manual and the signal names.

Testing

Always be sure the computer and transceiver are turned off before you plug the interface cables into them. Turn on the computer and transceiver. With the interface turned off, the transceiver will function normally. Now, turn on the interface. The interface LED should light, and some of the IC-720 front-panel functions, such as VFO controls and the HAM/GENERAL COVERAGE button, will no longer function. That's a good sign. If the interface LED doesn't light and the IC-720 functions don't lock up, then the interface isn't getting power from the transceiver. Check the power connections at the transceiver

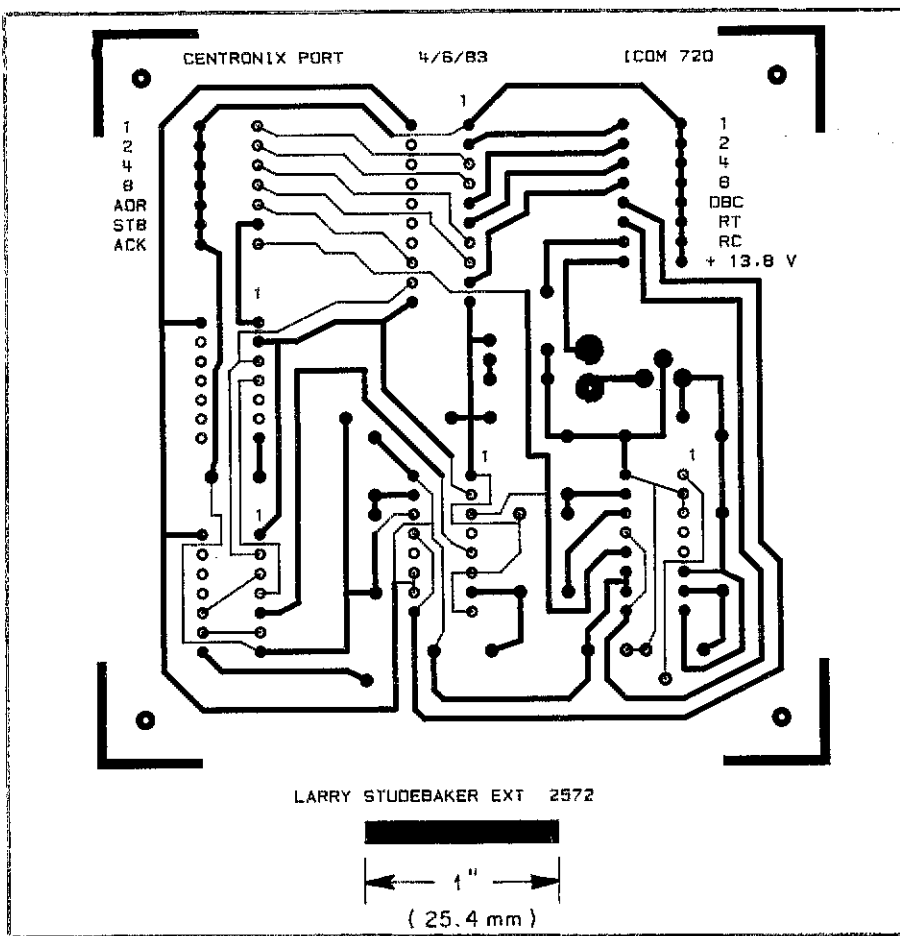


Fig. 3 — A PC-board etching pattern for the IC-720 computer interface. The pattern is shown full size from the foil side. Black represents unetched copper.

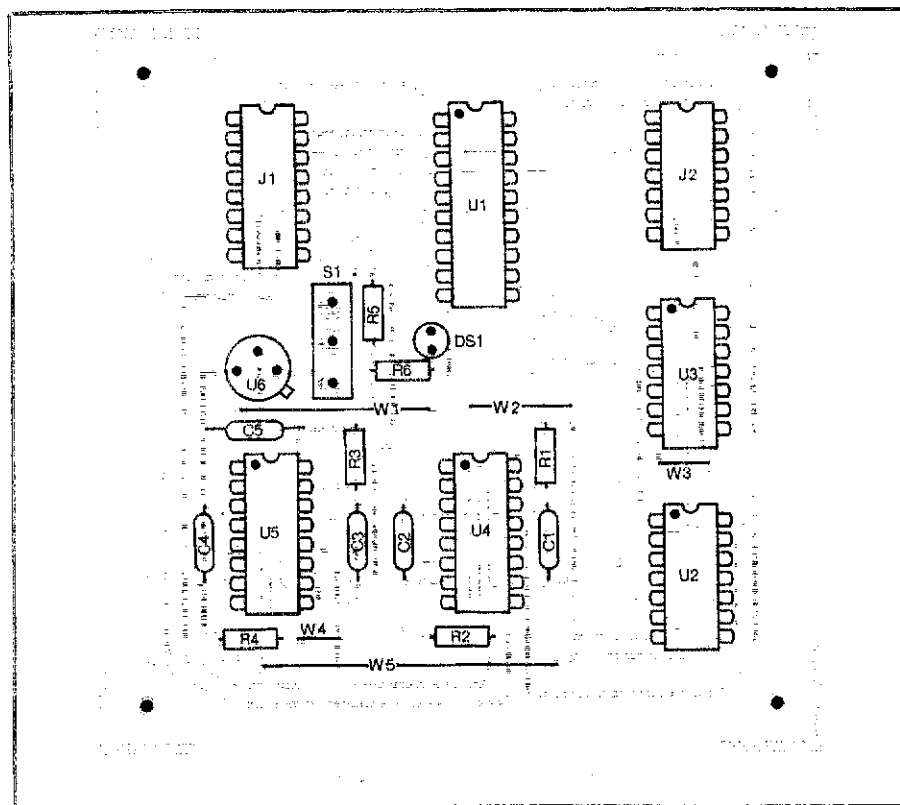


Fig. 4 — Parts-placement diagram for the interface board. Components are shown on the nonfoil side of the board, and gray areas represent copper on the bottom side.

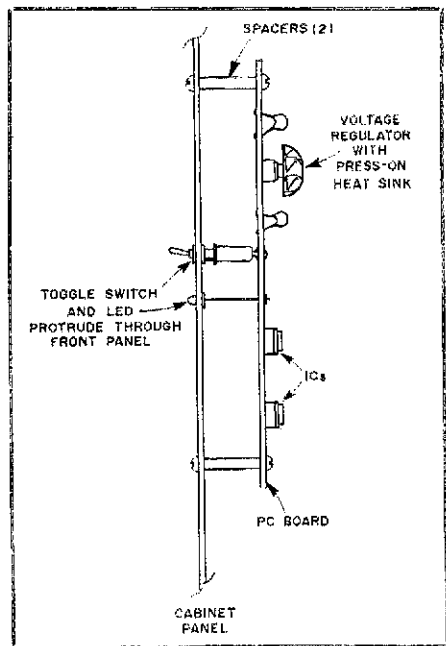


Fig. 5 — A sketch shows a method of mounting the interface board to the front panel of the cabinet. Note the use of a press-on heat sink with the voltage regulator IC.

and at the 5-V regulator. If the LED doesn't light, but the IC-720 functions do lock up, then the LED may be installed backwards.

Now attempt to send a complete command such as:

PRINT ".6:071000"

If all goes well, the transceiver will be set to CW operation at 7.100 MHz. Now experiment with the front-panel controls to see which ones work while under computer control and which ones don't. The frequency and mode can be changed, as well as the receive/transmit and VOX functions.

If your interface is not working properly, recheck the connector wiring and the wiring of the RC line to the 5-V supply through the 100-Ω resistor. If, in the course of checking things out, the IC-720 display goes blank or displays nonsense, don't panic. Just turn the transceiver off for about a minute; when you turn it back on, everything will be back to normal.

Assuming all has gone well so far, execute a few complete PRINT statements to get the feel of remote operation. When changing bands, the PRINT statement should be repeated after 1 or 2 seconds to allow for the IC-720 relay switching. Otherwise, you may get a correct display, but the wrong mode or VFO may be selected. This is a normal part of interfacing to the IC-720, and any software written will have to account for it with a WAIT statement or something similar.

Creating Software

To me, this was the best part of building

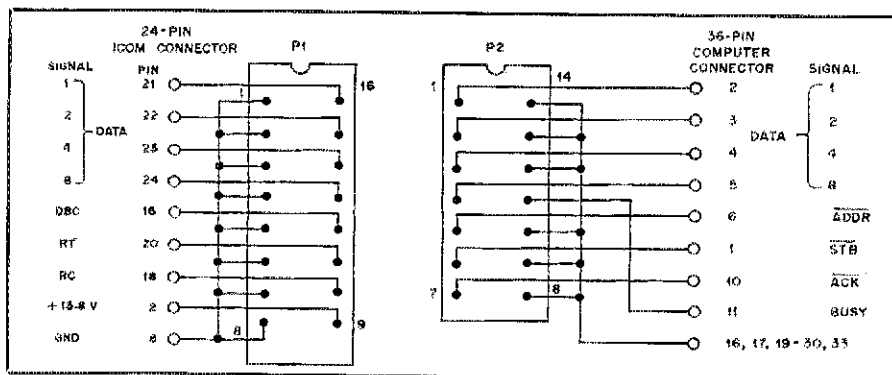


Fig. 6 — Connector wiring for the interface-to-transceiver cable is shown at A, and the wiring for the interface-to-computer cable is shown at B.

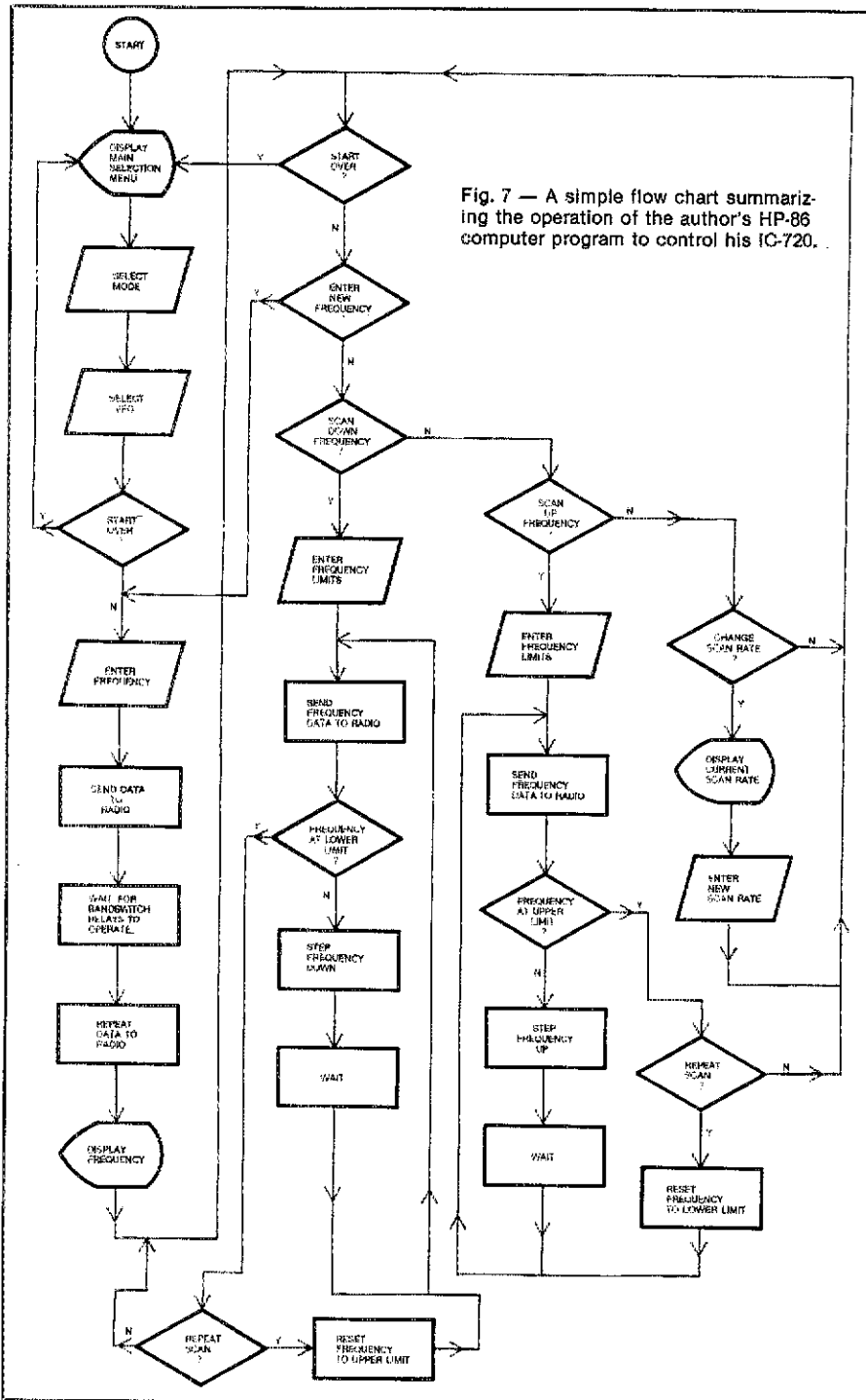


Fig. 7 — A simple flow chart summarizing the operation of the author's HP-86 computer program to control his IC-720.

the interface. Some elaborate software can be created, with time and patience being the only limits. For the SWL, disk files of station call letters, frequencies and locations could be used to select automatically the best frequency for listening to a particular station based on the time of day. This could eventually grow into a sort of computerized SWL world frequency chart. For the dedicated amateur, key words could be used to dial up frequently used frequencies.

The ability to simply sweep up and down the band while sitting and reading a book is nice. If an interesting signal is heard, the computer can be PAUSED and the transceiver front-panel controls used to tune in the signal accurately. If you already keep computer files of contacts and frequencies, you could easily go looking for old friends by typing in their call letters and letting the computer search the frequencies that you have found them on before.

While it's impossible to give complete functioning programs that will work with all home computers, an example will serve to get you started on some programs of your own. If your computer has user-assigned "soft keys," they can be used to direct transceiver control while the program is running. Fig. 7 is a flow chart from a program I have written for my HP-86 computer. I used the "ON KEY#" statement in my version of BASIC to assign soft key functions. At the beginning of the program, these are used to select mode, VFO and frequency. Later, they are used to sweep the frequency up or down, change the sweep rate or to restart the program. While many of the statements from my program won't transfer directly to another computer, studying this flow chart should give you some idea about the degree of control available.

Conclusion

It is possible to speed up interface operation by shortening the pulse lengths below the ICOM standard specifications. The limits here are the increased noise that occurs in the receiver when changing frequencies and the onset of data loss to the '720 (perhaps the reason ICOM kept the interfacing slow in the first place). I have had success with a DBC pulse as short as 1 ms, and an RT pulse as short as 100 μs. Operation seems to be affected on the lower frequencies first. You are entirely on your own here (no warranty expressed or implied!). I'd like to hear about any really ambitious completed software projects for controlling the IC-720.

Notes

¹ICOM America, 2112 116th Ave., N.E., Bellevue, WA 98004.

²The author has had 250 PC boards made so interested IC-720 owners could build the project easily. They are available for \$3 each (including postage) from Larry Studebaker, 1458 Post Ranch Rd., Santa Rosa, CA 95405. The ARRL and QST in no way warrant this offer.

Heath EE-3404 6809 Microprocessor Training Course

The Heath EE-3404 Training Course is a sequel to Heath's EE-3401 Microprocessor Course, which is a part of the Heath ETS-3401 Microcomputer Training System.¹ Included in the EE-3404 package is a preassembled 6809 adapter board, which is designed to plug into the ET-3400 (or ET-3400A) Microprocessor Trainer — also a part of the ETS-3401 system. The EE-3404 course assumes that you are quite familiar with the material in EE-3401 and have an ET-3400 (or ET-3400A) available for performing the experiments.

MC6809

The Motorola MC6800 microprocessor is the heart of the ETS-3401 System. It is an 8-bit microprocessor designed for the dedicated and the systems markets. Motorola developed the MC6809 8-bit microprocessor for the systems market only. It is essentially a "souped up" 6800. Hence, Heath's choice of approach in teaching the student to understand and use the 6809 is quite logical.

Motorola wants the 6800 users to have little trouble learning to use the 6809, so they employ the fundamental 6800 architecture in the 6809 design. Motorola also sought to have software compatibility at some level. This compatibility exists at the source-code (mnemonic) level. The 6809 does not contain dozens of new instructions, but it has over three times as many addressing modes as the 6800.

The 6809 has features that are particularly well suited for the systems market. In the 6809, a program is position independent; it will execute properly when placed anywhere within the memory address map. The 6809 allows a subroutine to be shared by several tasks at the same time. Also, the 6809 permits high-level, block-structured languages — such as Pascal, BASIC, FORTRAN and COBOL — to be compiled into more efficient and faster-running machine code than is possible with earlier processors, such as the 6800.

The Course

The EE-3404 text consists of seven chapters of study material and one chapter of experiments, along with several appendixes, contained in a large, loose-leaf binder. At the end of each of the first seven chapters, you are instructed to turn to Chapter 8 and perform certain experiments. Each of the first seven chapters contains, in addition to the text material, an introduction (overview of the chapter), the unit objectives, a unit activity guide and a unit examination at the end. Some of the chapters also have review questions. This is an extremely effective teaching method, when no "live" teacher is present to interact with the student.

The first chapter covers the 6809 fundamental concepts, with particular attention to points of departure from the 6800. For instance, the

6809 has one 8-bit register and three 16-bit registers not found in the 6800. Because less data movement between the internal registers and memory is required, the 6809 speeds data throughout.

Chapter 2 brings you to the addressing modes available with the 6809. This may well be the heart of the course, since the remaining material is largely dependent on a thorough understanding of the powerful addressing modes of the 6809.

Registers and data movement are covered in Chapter 3. Most of the instruction set is introduced in this chapter. Although the arithmetic, logic and test instructions are similar to those of the 6800, Chapter 4 shows the student how to use them with various addressing modes.

Chapter 5 covers branching and miscellaneous instructions. Of the miscellaneous instructions, the software interrupts should be of particular interest. In the 6800, there is only one software interrupt, and it is often taken up by the firmware, leaving the user without an interrupt. The 6809 has three software interrupts, which should alleviate this problem. Input and output signals are covered in Chapter 6 — again, the emphasis is on the superiority of the 6809 to the 6800. Finally, Chapter 7 presents some basics of "real world" uses of the 6809. Several different system formats are sketched.

The experiments in Chapter 8 consist of relatively short programs that are entered and run on the ET-3400 trainer with the 6809 adapter board installed. Each program is relatively short and consists of from three to 15 statements that must be entered via the hexadecimal key pad on the trainer. Most of the programs provide insight into the difference between the 6809 and the 6800. Some of them are routines that would prove useful to a designer or programmer writing a long program for use on a 6809-based system. No additional test equipment is required to perform the experiments.

Installation

The 6809 adapter module plugs into the socket normally occupied by the 6800 on the ET-3400 (or ET-3400A) trainer. Adapter installation is slightly different, depending on which version of the trainer is available. The ET-3400A works with the adapter module alone, but the ET-3400 requires a clock and reset modification to replace the 6875 clock. I have the ET-3400.

All parts for the ET-3400 modification are supplied with the course. A 16-pin DIP plug serves as the "board" for the circuit. One resistor, one electrolytic capacitor and three wires are soldered to the plug. Construction took about 10 minutes.

To make the modification, you must disassemble the ET-3400 and remove the circuit board to get to the socket holding the 6875. After removing the 6875, you simply insert the DIP plug into the socket and reassemble the ET-3400. This procedure took less than 15 minutes.

Once the DIP plug is installed, remove the 6800 microprocessor and its ROM, and store them in the protective foam supplied. The 6809 adapter board is then inserted into the 6800

socket. Installation is then complete. If you desire to reinstall the 6800, it is accomplished by reversing these steps.

If the ET-3400A is available, installation is even simpler. There is no need for the clock and reset adapter. Thus, you need only remove the 6800 and ROM and insert the 6809 into the socket.

For either procedure, the instructions are clear. Anyone capable of handling a soldering iron and a screwdriver should have little trouble completing the installation in the ET-3400; with the ET-3400A, even less skill is required.

Evaluation

Heath assumes that you are quite familiar with the functions of the 6800. Because it had been some months since I completed the EE-3401 course, I was a little "rusty" on some of the material. After working through the first couple of chapters, I found I did not understand much of what I was covering. I reviewed the EE-3401 material. Once I had the 6800 characteristics firmly in mind, the material in this course made a great deal more sense.

The course material is well prepared, and the presentation seems well thought out. I found that the experiments really did provide a great deal of insight into the functioning of the 6809. Unlike some of the programs in the EE-3401 course, which consists of over 150 statements, the programs in this course are all short and easy to debug — again, it was "cockpit errors" that caused me trouble.

If you pass the optional final exam with a score of 70% or better, you are entitled to three Continuing Education Units (CEUs) and a Certificate of Achievement. As with the other courses in this series, Heath offers a complete money-back guarantee.

If you are already familiar with the 6800, have an ET-3400 or ET-3400A available and would like to learn about the 6809, I would recommend you give serious consideration to Heath's EE-3404. Price class is \$100. More information may be obtained from the Heath Company, Benton Harbor, MI 49022. — *Peter R. O'Dell, KB1N*

KLM 7.2-2 40-METER MONOBAND YAGI

□ Low-band DXing has always been a challenge to me. There is a special thrill associated with pulling a "new one" out of the static that can't be rivaled, even on the higher bands. Unfortunately, some type of directional (preferably rotatable) array is necessary to be competitive on 40 meters. Such antennas are normally quite large, presenting mechanical problems. Smaller arrays *can* be used, but often suffer from severely reduced performance. KLM has managed to work around these limitations and come up with a 40-meter Yagi that works well, without straining your tower or pocketbook.

The 7.2-2 is a two-element Yagi (driven element and reflector) designed for the low-band enthusiast who lacks the real estate for a full-

¹Product Review, QST, Sept. 1982, pp. 38-39.

*Assistant Technical Editor



Fig. 1 — Close-up of the Lexan boom-to-element insulator.

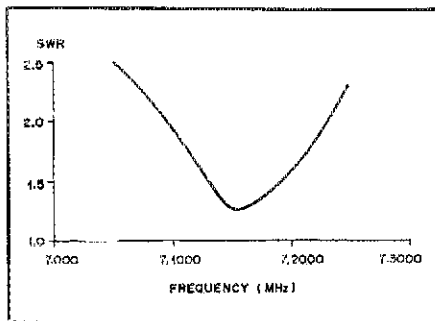


Fig. 2 — SWR vs. frequency curve for the KLM 7.2-2. For this test, the antenna was side-mounted to the tower at approximately 40 feet.

sized "monster" array. Most rotators designed for use with medium-size amateur antennas should be adequate to turn this array. Weighing in at only 46 pounds, the beam presents a 6-square-foot wind load! That's just over half the size of my KY-34XA! How is this possible? Linear loading is used to shorten the elements by 33% — the longest element is only 46 feet long. The 16-foot boom is constructed of 3-inch-OD aluminum tubing, which should stand up well even under adverse weather conditions.

Mechanical Details and Assembly

Although the 7.2-2 contains a multitude of parts, it is easy to assemble, thanks to a well-written instruction manual. In addition to clearly spelled-out directions, assembly details are presented by pictorials, to double-check each step. Total assembly time, from the boxes to the tower, was approximately six hours.

First, check each part against the parts list. This ensures that nothing is missing, while familiarizing the builder with each component before it is called for.

The boom is supplied in two 8-foot sections. One section is swaged, for insertion into the other. Two ¼-inch-diameter, 3½-inch-long bolts run through the boom, holding the two pieces together.

Next, the elements are assembled. Constructed from telescoping tubing decreasing in size from ¼ to ½ inch in diameter, each element consists of four additional 3/8-inch-diameter by 11-foot linear-loading tubes. These tubes are attached to the approximate midpoint of each element half, and fold back toward the boom. While this adds complexity to the construction of the elements, it allows significant mechanical advantages

(weight reduction, decreased turning radius and wind loading) over conventional half-wave designs. Lexan insulators are used to maintain spacing between linear loading sections, and aid overall mechanical stability.

The elements are attached to the boom next. A hefty Lexan insulator, shown in Fig. 1, is used as the element-to-boom bracket. Element halves seat in semicircular channels atop the insulator, and are held in place by a pair of no. 10-32 screws. Each screw runs through the 1¼-inch-OD element and the insulator, providing mechanical rigidity.

The matching section is assembled last. Approximately 6 feet long and constructed of two 3/8-inch-diameter aluminum tubes, it mounts to the front of the boom and is fastened in three places: on the boom with a self-tapping sheet-metal screw, and on two of the previously mentioned no. 10-32 element-mounting screws. A 560-pF, 2500-V capacitor attaches to the outer tip of the matching tubes. Unfortunately, this is the weak point in KLM's design — the capacitor can be damaged if high power is applied to the antenna with an SWR greater than 2:1. KLM recommends the use of a transmitter power output of no more than 200 W under these conditions. After destroying the first capacitor, I noticed the warning in the instruction manual, and took heed. A friend with a similar antenna (KLM's three-element version) cured this malady by replacing the 2500-V capacitor with a 7500-V unit.

No tuning is necessary after construction — the matching section dimensions for each segment of the 40-meter band are given on the instruction page. Just set it, and forget it! I set the antenna for the middle of the band and, with the antenna side-mounted to my tower at 40 feet, obtained the SWR curve shown in Fig. 2.

Operation

The KLM 7.2-2 has been in service at W1OD, and has survived the bulk of two New England winters with no problems. Signal reports have been gratifying, and prompted me to enter the CW section of the ARRL November Sweepstakes in the A (low-power) category. To say the least, I was amazed at the performance difference between the Yagi and my doublet. Signals that are in the noise with the doublet jump up to Q5 copy with the beam. Checks with numerous stations indicate that using my barefoot rig (100-W output) with the beam is just as potent as the kW (input) into the doublet. Not a bad deal!

If you would like to have a 40-meter signal that will get through the pileups without the need for a separate support structure, check out the KLM 7.2-2. It might be just what you're looking for! The beam is available from KLM Electronics, P.O. Box 816, Morgan Hill, CA 95037. Price class: \$400. — *Michael B. Kaczynski, W1OD*

THE MPS CW MACHINE II

□ With so much computer software presently available to amateurs, it's hard to know which package will best fit your needs. Recently, I had the opportunity to use the MPS CW Machine II software designed for the TRS-80® micro-computer. This program is available on disk and will run with TRSDOS or NEWDOS. It requires a minimum memory of 32 kbytes and one or more disk drives, and is easily converted for use with the Model 3.

The instruction booklet contains explanations of all the program functions, directions for con-

necting your rig to the computer (complete with schematics) and important program line numbers for making modifications. It is well written and helpful.

The CW Machine II will transmit CW at speeds between 10 and 100 WPM, and can receive at speeds between 10 and 155 WPM. Best copy occurs within 10 WPM of the selected rate. Tapes generated on an Apple® computer were used to verify the receive rate of the MPS software. The transmit rate was calculated by measuring the time necessary to send text stored in memory. Default values for the send and receive rates are 25 WPM, but can be changed at any time with a keyboard command. Included in the program parameters are key-debounce times for receive and transmit. The debounce time can be adjusted to suit your keyboard or typing ability.

Previous versions of this program were equipped with a 250-character type-ahead buffer that has now been increased in size to 3200 characters. The most recent 256 characters remaining in the buffer are displayed at the bottom of the screen during the transmit mode, and during receive when in the split mode. The buffer contents are corrected easily with the left-arrow key.

There are 18 single-keystroke commands that control the program. They are accessed easily, and the options are well prompted. Should you forget them, one command recalls the entire menu.

Connecting the TRS-80 to Your Rig

The cassette interface is used to connect the computer to your rig. Audio output from the radio goes directly from the speaker to the cassette audio input. The instructions show several transmit options, the simplest of which uses the cassette-motor on/off relay contacts in the computer. This method is not recommended for continuous or heavy-duty operation. Instead, the audio output from the computer should be used to switch an external relay, or transistor, that in turn keys the transmitter.

Line Numbers

The programmer has conveniently included lines in the BASIC program that can be extended to create permanent messages. The maximum length of each of these messages is 128 characters. A keyboard command will transmit any of the permanent or temporary (created each time you run the program) messages (up to nine) whenever you wish. You can also change any of the messages (permanent or temporary) at any time.

Data for operating the program is also included in one of the program lines. By changing the data, you change the program start-up parameters. For example, you can set the program to initiate whatever receive or transmit speed you desire. The start-up data also includes space length and debounce times.

Operation

The program is easy to use. It is written with the contester and high-speed operator in mind. The split-screen function and large input buffer are particularly nice features. Being able to view the active memory buffers and create general messages make operating fun and efficient. The only problem I found while running the program is that the cursor continues to move even though it is not copying CW. This means that information on the screen will disappear while the machine waits for input.

²kg = lb × 0.454; mm = in × 25.4;
m = ft × 0.3048; m² = ft² × 0.0929.

The operating speed can be changed during transmit or receive without changing modes, so you don't miss a thing. You can even have the computer send random code practice. I would recommend this system to anyone who owns a TRS-80 microcomputer.

The MPS CW MACHINE II is available from Micro Pro Systems, Rte. 2, Box 533, Cumming, GA 30130. Price class: \$25. — *Jonathan Towle, WBIDNL*

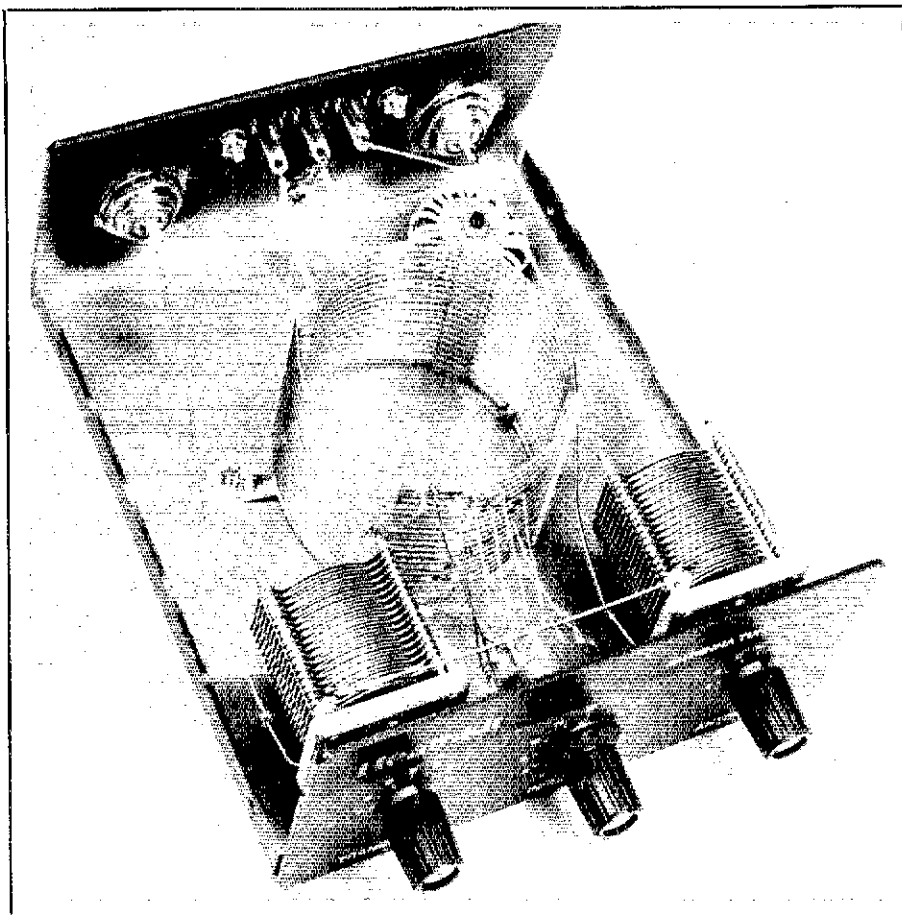
HEATH HFT-9 ANTENNA TUNER

□ Heath's HFT-9 is a bare-bones antenna-matching network designed for the QRP operator. Rated for 50-W maximum power handling capability, the HFT-9 will work with coaxial lines, random-length end-fed wires or balanced feeders. During construction, the kit builder may select either 80-10 or 160-15 meter operation.

The HFT-9 employs two variable capacitors and a tapped inductor in a T network. The inductor is switched by a small, plastic-encased rotary switch. To select 160-15 meter operation, an additional 100-pF fixed capacitor is wired in parallel with each of the variables. A 4:1 toroidal balun is used for tuning balanced feeders.

The kit took about an hour and a half to build. Heath has prepared an excellent instruction manual, complete with detailed drawings, so there were no unanswered questions during construction. The instruction manual also includes several pages of tips to help the amateur use the tuner.

In the ARRL lab, we measured the HFT-9's insertion loss at a respectable 0.3 dB. The matching network handled the rated 50 W into a 50-ohm dummy load with no complaints. During on-the-air tests, the HFT-9 successfully matched a variety of coax-fed, long-wire (including a random length of hookup wire thrown across the ARRL lab floor) and open-wire-line-fed antennas.



Good performance at a modest price makes this tuner a station accessory to consider for the QRP operator, while its compact size and light weight make it a natural for portable operation.

The HFT-9 measures 2-5/8 × 5-1/2 × 7-1/2 in (HWD) and weighs 1-1/2 lb. Manufacturer: Heath Co., Benton Harbor, MI 49022. Price class: \$55. — *Mark Wilson, AA2Z*

New Products

MOTOROLA MC145450 1200-BAUD MODEM

□ This silicon-gate CMOS FSK modem is TTL compatible and can be pin programmed for Bell 202 or CCITT V.23 operation. The 22-pin DIP IC derives internal timing from an external 3.6864-MHz crystal. In the Bell 202 mode, the main channel can receive data at up to 1800 bit/s, while the back channel can send at baud rates up to 150 bit/s. For V.23 application, the chip is Mode 2 compatible for a baud rate of up to 1200 bit/s on the main channel and up to 75 bit/s on the back channel.

A logic-controlled mode input selects the frequency pair used for modulation and demodulation, as well as the transmit and receive baud rates. The clear-to-send (CTS), which goes low in response to a high-to-low transition on the request-to-send (RTS) line, can be delayed under logic control in eight steps from zero to 426.6 ms. Additional functions include logic-controlled self-test,

transmit test, answer-back and soft turn-off functions.

The MC145450 is less than \$10 in quantities of 1000. For further information, contact your nearest Motorola sales office or local distributor. — *Paul K. Pagel, N1FB*

SNYDER ANTENNA CORPORATION WIRE

□ Take heart, urban dwellers! There is an antenna wire that is relatively immune to the deteriorating effects of air pollution and moisture. Not only that, this wire is strong and it resists stretching with time. (Soft-drawn copper tends to stretch after it has been aloft for a period, causing SWR changes.) The Snyder wire doesn't stretch a measurable amount.

What makes the Snyder wire so special? Well, it contains seven strands of zinc-plated steel over which the manufacturer has wound 12 strands of pure copper wire. The bundle is the electrical equivalent of 14-gauge copper-clad steel wire. Despite this rugged format, the wire is quite

flexible and does not tend to coil up and strike at the user as a snake might do! This is not true of straight copper-clad steel wire of the single-conductor variety.

Another positive feature of the wire is the use of insulating jacketing. The outer cover is "tubed" rather than extruded. As a result of this fabricating technique, the wire is easier to strip than the extruded type. Also, the overall flexibility of the Snyder wire is excellent. Snyder's jacket material is ultraviolet resistant, which makes it a good bet for longevity in the presence of weather effects and sunlight.

To avoid the possible problems of electrolysis between the copper and steel conductors, solder all conductors together at the ends of the antenna elements. The manufacturer recommends the use of a noncorrosive sealant at the open ends of the antenna wire, once the radiator has been cut to length and has undergone the final trimming process. This will prevent dirt and moisture from entering the jacket. I used epoxy cement for this purpose when I erected my 80-meter dipole that used the Snyder wire. Although I live in a rural

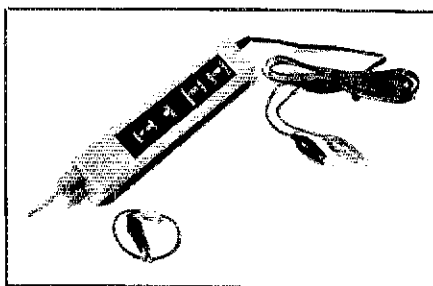
region where there is little air pollution, it is comforting to know the little antenna will probably outlast me! I may even will it to my son, KA1BUQ!

The price per 100 feet of the wire is \$15. It is available from Snyder Antenna Corporation, 250 East 17th St., Costa Mesa, CA 92627, tel. 714-760-8882. — Doug DeMaw, W1FB

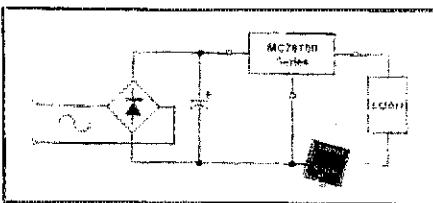
RADIO SHACK® DIGITAL LOGIC PROBE

□ This probe provides you with a means to peek inside the workings of digital circuits. Color-coded LEDs indicate high, low or pulsed logic states at frequencies of up to 10 MHz. An audio tone output is available, too.

The probe is overload and polarity protected. Power for the probe is provided by the circuit under test through a pair of 36-inch leads attached to the probe and terminated in alligator clips. Each probe is supplied with instructions and troubleshooting tips. The Digital Logic Probe (RS 22-302) is available at your nearest Radio Shack store. Price class: \$20. — Paul K. Pagel, N1FB



Radio Shack® Digital Logic Probe



Motorola Voltage Regulators

MOTOROLA VOLTAGE REGULATORS

□ Motorola offers a family of fixed-output,

three-terminal voltage regulators with a load driving capability in excess of 3 A. The Motorola MC78T00 series of regulators are available in 5, 6, 8, 12, 15, 18 and 24-V versions. These devices

provide improved load and line regulation over existing industry products, and have guaranteed limits for thermal regulation and ripple rejection.

According to the manufacturer, the Prime Grade (A suffix) units of the series offer even tighter specifications on many of the electrical characteristics, including a 2% output-voltage tolerance. For example, the Prime Grade, 5-V devices (MC78T05AC) have a load regulation within 25 mV over the entire load range and line regulation (output-voltage variations due to line input-voltage changes) is less than 10 mV. This is a four-fold improvement in load regulation and 2½ times better for line regulation over other existing popular 5-V, 3-A regulators.

All of these monolithic devices employ internal current limiting, thermal shutdown and safe-area compensation. Although designed as fixed-voltage regulators without external components, these devices can be used with additional components to obtain adjustable voltages and currents. This series of regulators can also be used with a series pass transistor to boost the 3-A output to 15 A.

These regulators are offered in standard and A-suffix versions, plastic TO-220 (T-suffix) and metal can TO-3 (K suffix) packages, and in two temperature ranges. Contact your local Motorola sales office or nearest distributor for further information and pricing. — Paul K. Pagel, N1FB

Strays

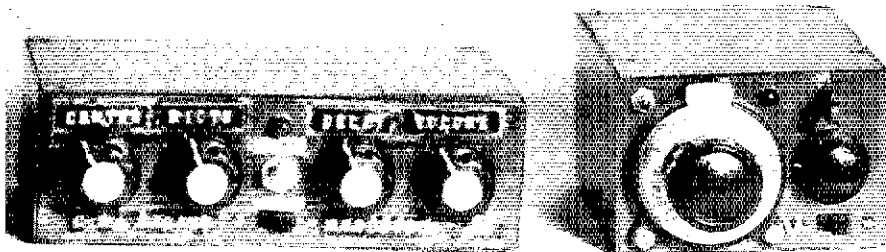


INTEGRATED QRP

□ Jim Roberts, WA9WJV, built the units shown in these photos. The unit to the right (in the top photo) is Jim's version of Roy Lewallen's (W7EWL) compact 7-MHz D-C transceiver, complete with Wes Hayward's (W7ZO1) electronic keyer and a built-in paddle.^{1,2} Transceiver power output is variable up to 5 W maximum. An LED serves as the output indicator. The other item in the photo is an active audio filter/tone generator.³

In order to keep the unit within a chosen box size of 1.8 × 2.7 × 3.5 in HWD (46 × 68 × 89 mm), Jim built the various transceiver stages on small pieces of PC board, mounting the ICs upside-down ("dead-bug" fashion), and used point-to-point wiring techniques. This can be seen in the bottom photo.

A ham since 1958, Jim holds an Extra Class license and is a life member of the ARRL. In addition to the projects shown here, Jim reports that he's successfully built many other QST projects and finds them challenging. He's ready to answer any construction questions about the units shown in these photos if the inquiry is accompanied by an s.a.s.e. — Paul K. Pagel, N1FB



¹R. W. Lewallen, "An Optimized QRP Transceiver," QST, Aug. 1980, pp. 14-19.

²W. Hayward, "An Integrated Circuit QRP Keyer," QST, Nov. 1971, pp. 38-39.

³D. Jagerman, "The KC2FR QRM Fighter," QST, July 1982, pp. 28-30.

EXPANDED-SCALE METERS

□ Many times I have found myself wishing the calibration marks on a meter face could be spread out so I could read the meter more accurately. The straw that finally broke the camel's back was an attempt to read a 50-V dc meter for 1-V variations. Finding very little information on how to expand a meter scale, I collected some parts and began to experiment.

I found a way to expand a dc meter scale with only a few added components. It is possible to achieve similar results using Zener diodes to drop the voltage, but that requires careful selection of just the right Zener diode voltage. The bridge circuit does not require such careful selection. You can make a meter read from 8- to 11.5-V dc to check the voltage of a NiCd battery pack, or one can be made to read from 115- to 125-V ac to monitor the line voltage.

This expansion is accomplished by the use of a Wheatstone Bridge circuit. The meter indicates the current through the center path of the bridge when the voltages across the arms are unequal. A classic Wheatstone Bridge circuit is shown in Fig. 1.

When the bridge is balanced, $R3/R5 = R2/R6$ and the current through $R4 = 0$. The voltage between points A and D on Fig. 1 will be 0, and if a milliammeter is connected between these points, it will read 0. We can put this knowledge to practical use to expand the scale on our meter.

As a design example, let's build a circuit that will indicate a voltage from 12- to 14-V dc. I found a 0- to 100- μ A dc meter in my junk box. We also need a Zener diode rated at about half the voltage to be measured. In this case, a 6.2-V Zener diode is about right. With a few resistors we'll be all set. The schematic diagram is shown at Fig. 2.

To be sure that the Zener diode will maintain the 6.2 V over the operating range of our circuit, we need to perform some calculations. For a 1-W, 6.2-V Zener diode, the maximum current is 0.16 A. Therefore, the minimum value for $R6$ is

$$R6 = (14.0 \text{ V} - 6.2 \text{ V}) / 0.16 \text{ A} = 48.75 \Omega \text{ (Eq. 1)}$$

Actually, I would not use a value this small, since it would produce too much current drain on the battery we want to monitor. A 2400- Ω resistor for $R6$ will require only 3.25 mA at 14.0 V into the bridge circuit.

The voltage across $R3$ must equal the voltage across the Zener diode when the bridge is balanced (meter reads 0). $R2$ will be nearly equal to $R3$. I found a 7500- Ω trimmer potentiometer and a 6800- Ω resistor that measured 6500 Ω .

Assemble these components on a breadboard and adjust $R2$. With 12 V applied to the circuit, set the trimmer so the meter reads zero. I decided to replace my trimmer with a fixed-value resistor, so I measured the resistance after the bridge was balanced. The trimmer was set to 6640 Ω , so I installed a 6600- Ω resistor at $R2$. When I adjusted the input voltage for a zero meter reading, it took

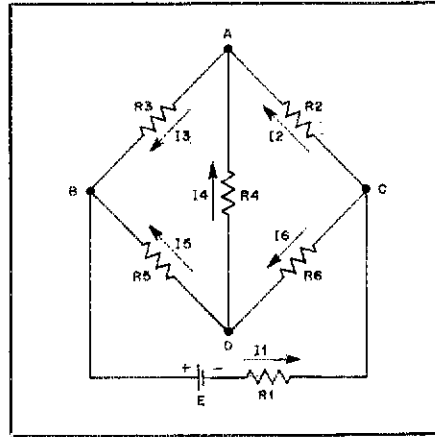


Fig. 1 — Schematic diagram of a basic Wheatstone Bridge circuit.

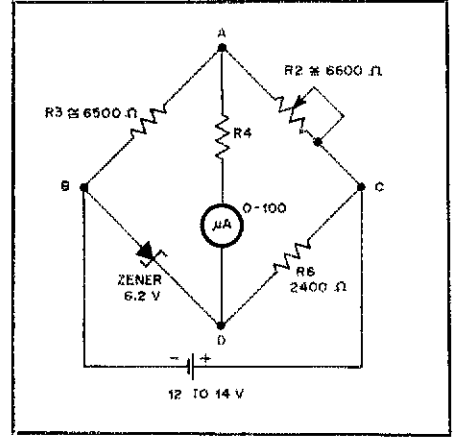


Fig. 2 — Bridge circuit for an expanded-scale voltmeter.

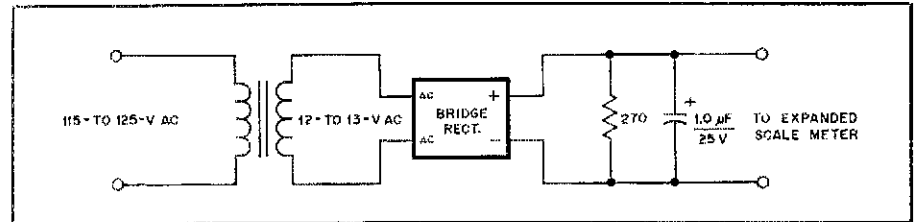


Fig. 3 — A low-voltage transformer and rectifier circuit can be used to monitor the ac line voltage with an expanded-scale dc voltmeter.

11.9 V. Since a new scale must be drawn for the meter anyway, this is not a problem.

What about the full-scale reading? I measured 12.7 V for a full-scale reading, so I inserted $R4$ in series with the meter to produce a full-scale reading with 14 V applied to the input. The value for $R4$ can be determined experimentally. This circuit provides a convenient way to monitor the input voltage to a mobile rig designed to have an operating voltage of 13.8-V dc.

What about other voltage scales? Choose a Zener diode with an operating voltage of about half the minimum voltage you wish to measure. Then match the resistors to get the scale you want on the meter. I mount the components on a piece of perf board and fasten this to the terminal studs on the back of the meter.

The expanded-scale method may be used for ac measurements as well. For example, a range of 115 to 125 V might be used to monitor the line voltage. Fig. 3 shows a schematic diagram for a circuit to do just that. A small transformer reduces the voltage to a suitable value. The voltage is then rectified, filtered and fed to an expanded-scale meter.

A new meter face must be drawn to suit the particular voltage scale desired. This can be done by hand, calibrating the scale to known measured voltages. You might want to use rub-on lettering, or hand draw the scale with a fine-point pen. Be sure to use a permanent-marking pen. After

the dial has been recalibrated, I like to give it a light coat of clear spray lacquer. — Harry Neben, W9QB, Dunedin, Florida

EXPANDED-SCALE METERS

□ To monitor the storage batteries used in a solar-power system, I needed to measure a voltage between 10 and 15, so an expanded-scale voltmeter seemed like a good way to meet my requirements. The circuit employs a series of diodes to subtract 10 V from the battery voltage before it is applied to the meter. The remaining voltage, between 0 and 5 V (depending on the battery charge), appears across a 2.7-k Ω resistor. This voltage is measured by a 0- to 50- μ A meter (Radio Shack no. 270-1751) and a series resistor. Fig. 4 shows the circuit diagram.

D1 to D3 are silicon diodes, which each drop the voltage by 0.7 V. Any silicon diodes, such as 1N914s, can be used here. D4 is an 8.2-V Zener diode, such as a 1N4738A. Other Zener-diode voltages can be used with combinations of diodes to produce a drop of approximately 10 V.

I built my circuit on a miniature, general-purpose circuit board from Oak Hills Research.¹ The components are tack-soldered in place on

¹Part no. BB-50, Oak Hills Research, 4061 N. Douglas Rd., Luther, MI 49656.

*Assistant Technical Editor

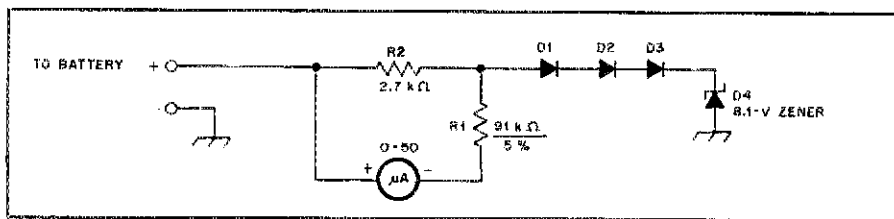


Fig. 4 — Diagram showing how N1RM used a string of silicon diodes and a Zener diode to reduce a battery voltage to produce an expanded-scale voltmeter to monitor the battery.

this board. The board is mounted directly on the meter terminals.

If you need to calibrate the meter for more accurate measurements than I did, you can reduce the value of R1 and insert a trimmer potentiometer in series with the meter. A trimmer of 25 kΩ and a value of 82 kΩ for R1 should be about right.

Other voltage ranges can be expanded by using an appropriate Zener diode and series dropping diodes. R1 and R2 can be adjusted to suit the meter you have. I did not change the meter scale for the circuit I built, but you may have to recalibrate the meter face for some applications. — Doug Blakeslee, N1RM, Brookfield, Connecticut

KEEPING BIRDS OFF ANTENNAS

□ [March 1984 *QST* contains a Strays item from Bill Mullin, AA4M, requesting information about how to keep birds from perching on Yagi antennas. The Hints and Kinks column received a number of suggestions ranging from the use of an owl decoy to other scarecrow-like devices. One of the more inventive solutions came from Jack Jordan, N9EFA, who even went to the trouble of drawing Fig. 5 for us. — Ed.]

Birds roosting on the ground-plane radials of my 2-meter vertical were causing a nasty fall-out on the patio. My solution to the problem was to place loose-fitting Plexiglas® tubing over the

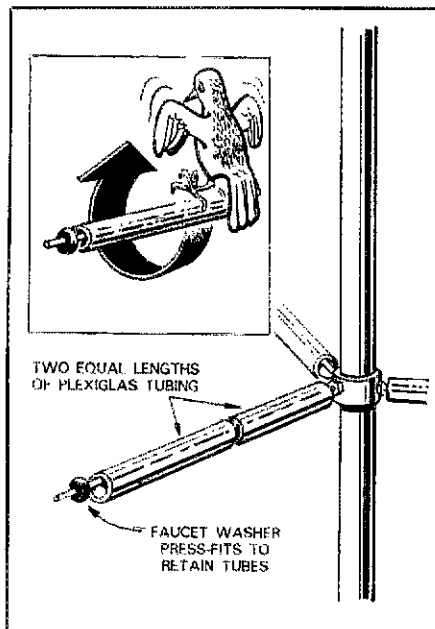


Fig. 5 — N9EFA uses thin-walled Plexiglas® tubing on the ground radials of his 2-meter antenna to keep birds from perching on them.

radials. This created a log-rolling effect when the birds tried to find a comfortable perch. See Fig. 5.

Originally, the tubes were in one piece for each radial. They had a tendency to bind, instead of rolling free. I sawed the pieces in half to prevent this.

The tubing sections are held in place by tight-fitting neoprene faucet washers. A dab of petroleum jelly helps them slide on easier.

This same technique should work for other horizontal antenna elements. The weight of the thin-walled tubing tends to be negligible, but keep the factor of increased wind loading in mind. — Jack Jordan, N9EFA, Chicago, Illinois

RETUNE A HUSTLER MOBILE ANTENNA 20-METER RESONATOR FOR 30-METER OPERATION

□ When I decided to try 30-meter mobile operation, I converted the RM 20 20-meter resonator from my Hustler mobile antenna. The process is very simple, and the new materials cost me less than \$2.

First, I removed the top whip portion of the antenna and replaced it with a 3-foot length of

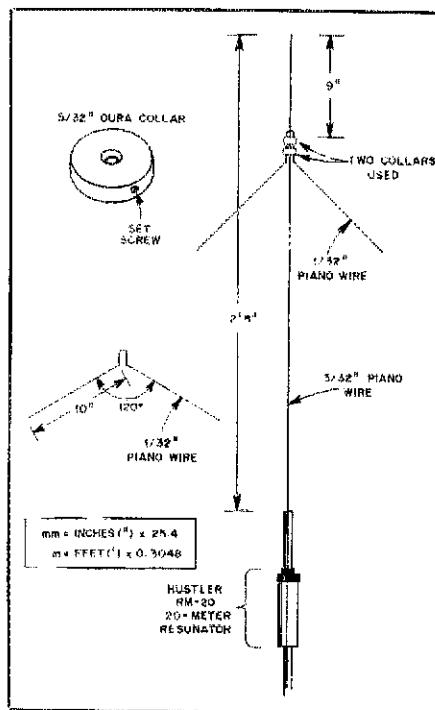


Fig. 6 — The fabrication of a capacitive hat to retune a Hustler 20-meter resonator for use on 30 meters is shown on the left. The installation of an extended whip section and the capacitive hat on the 20-meter resonator is illustrated on the right.

3/32-inch piano wire (available at most hobby shops).² Allow 2 feet 8 inches of the wire to stick out of the top of the resonator.

I bent a 21-inch piece of 1/32-inch piano wire to form two 10-inch legs at about a 120° angle, as shown in Fig. 6. This "capacitive hat" is attached 9 inches from the top of the whip. I used two 5/32-inch Dura collars, also available at hobby shops, to secure the hat.

For my system, these dimensions resulted in resonance at 10.0 MHz. You may have to adjust the position of the capacitive hat or the length of the whip to achieve resonance.

I am pleased with the operation of this antenna. My first contact with it was a station in Grand Island, Nebraska. Perhaps the best part is that the resonator is left intact. It is a simple matter to reinstall the original whip for 20-meter operation. — Wes Weathers, K6OZK, Lancaster, California

PROTECTING LOW-VOLTAGE MOTORS FROM OVERLOAD DAMAGE

□ When I built a mobile antenna-matching system, I was concerned about protecting the drive motor from overloading when the roller inductor came to the end stops. Originally, I used a slip-clutch arrangement.³ This worked fine for me, but others had some difficulty in duplicating my results. Later, I incorporated limit switches and diodes into one of my designs, and that solved the problem of a coil having too much drag for the slip clutch.⁴

Since then, I have done some research on motor-driven antenna-matching systems, and another solution to this problem came to light. I placed a 12.5-V, 1.5-W multicell flashlight bulb in series with the motor winding as shown in Fig. 7. The motor draws about 100 mA while turning the coil, and the light bulb has almost no effect. When the roller coil stalls the motor, the current goes up to 200 mA and the bulb burns brighter. Less than 300 mW is dissipated in the motor windings! I left a motor stalled overnight in this circuit and it didn't even get warm.

One positive side effect created by adding a bulb to the circuit is that the motor speed slowed a bit. I have also used automobile-dash instrument bulbs, such as GE no. 158 or AC no. L57, with success. — Don Johnson, W6AAQ, Esparto, California

²m = ft × 0.3048; mm = in × 25.4.

³D. Johnson, "Mobile Antenna Matching — Automatically," *QST*, Oct. 1982, pp. 15-20.

⁴Johnson, "Motor-Driven Roller-Inductor Limit Switches," Hints and Kinks, *QST*, Feb. 1983, p. 54.

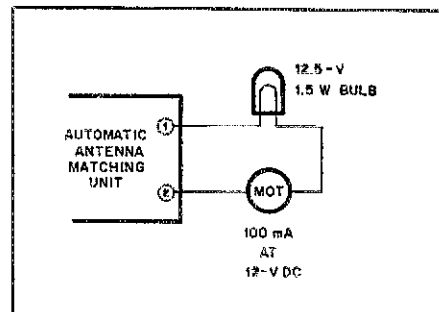


Fig. 7 — Circuit diagram showing how a small light bulb can be used to protect a 12-V drive motor from overloading when it stalls.

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LIMITATIONS TO BROADBAND IMPEDANCE MATCHING

□ Hall recently described his attempts to place a network at an antenna feed point to produce a reasonable impedance match over the entire 80-meter band.¹ This antenna would be of interest to any user of a modern solid-state transceiver. The problem is also a dramatic illustration of the general impedance-matching problem, with applications well beyond antennas.

Hall's work is numerical. He used an IBM® Personal Computer to model the 80-meter dipole. Reactive impedances were then numerically placed at the feed point in an attempt to realize the desired impedance match across the 3.5- to 4-MHz band.

The work presented in this note is also numerical. I have used the 80-meter dipole as the example, for it is of great practical interest. The concepts, however, are very general.

Baseband Concepts

Before examining the antenna problem, consider a slightly simplified one — a resistor with either a parallel capacitance or a series inductance. The goal is to design a network that provides an improved impedance match over a frequency band from dc to some higher frequency. This is termed a "baseband" problem. The networks (and the related mathematics) are simpler than those related to a narrow-band, high-frequency load.

The first termination considered is a resistor without a reactive component. Assume that a resistance of 25 Ω is to be matched to a 50-Ω source. The element required to effect this match is an ideal broadband transformer with a 2:1 impedance ratio, shown in Fig. 1. Although the transformer does not work well at dc, the impedance match, with the transformer, is perfect at all frequencies. The baseband, for this example, extends through the entire radio-frequency spectrum and beyond. There is no bandwidth limitation.

Consider, now, a more interesting example — a 50-Ω resistor paralleled with a 2000-pF capacitor. The impedance, Z, is the reciprocal of the admittance:

$$Z = \frac{1}{G + j\omega C} = \frac{G - j\omega C}{G^2 + \omega^2 C^2} \quad (\text{Eq. 1})$$

where

$$G = \frac{1}{R}$$

$$\omega = 2\pi f$$

G indicates conductance, and f is in hertz. The quality of an impedance match is

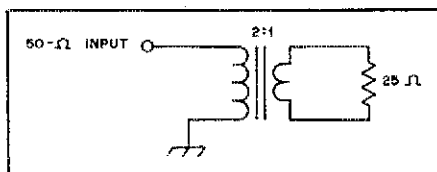


Fig. 1 — A simple impedance-matching problem without any reactance.

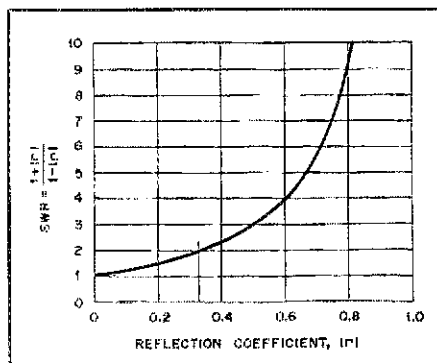


Fig. 2 — Standing-wave ratio (SWR) related to the voltage reflection coefficient ($|\Gamma|$).

evaluated through calculation or measurement of Γ , the voltage reflection coefficient:

$$\Gamma = \frac{Z - Z_0}{Z + Z_0} \quad (\text{Eq. 2})$$

where Z_0 is the characteristic impedance of a transmission line that might connect the load (Z) to a source. Z_0 is often 50 Ω and is the reference impedance for the evaluation of reflection coefficient.

Z is a complex number. Hence, the reflection coefficient is also complex. We often consider only the magnitude of Γ . $20(\text{Log } \Gamma)$ is called the return loss, and is measured easily with a suitable bridge.² Γ is related to SWR by

$$\text{SWR} = \frac{1 + |\Gamma|}{1 - |\Gamma|} \quad (\text{Eq. 3})$$

²W. Hayward and D. DeMaw, *Solid-State Design for the Radio Amateur* (Newington: ARRL, 1977), p. 152.

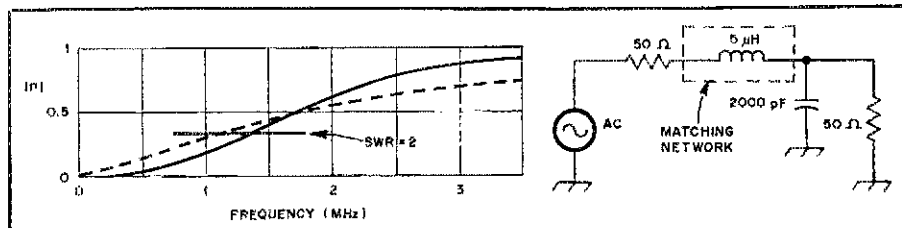


Fig. 3 — A baseband impedance-matching problem. The dashed curve shows $|\Gamma|$ for a reactive load, a resistor paralleled by a capacitor. The solid curve shows the resultant $|\Gamma|$ when a series inductor produces a second-order Butterworth filter.

where the bars around Γ indicate that only the magnitude is used in the calculation. Readers unfamiliar with the manipulation of complex impedances and admittances should study the review by Hall.³ A graph of SWR versus Γ is presented in Fig. 2.

The dashed curve of Fig. 3 is a plot of Γ versus frequency for the load described, a 50-Ω resistor paralleled by 2000 pF. The match is perfect at dc with $\Gamma = 0$, but becomes worse as frequency increases. The gain (formally, the "transducer gain") of the circuit may also be calculated. It is 0 dB (no loss) at dc, but -3 dB at 3.1 MHz. This is the bandwidth imposed by the shunt capacitance in the 50-Ω environment. Any reactance restricts bandwidth.

The load may be "tuned" to improve the impedance match at one frequency. A parallel inductor would cancel the reactive susceptance of the 2000-pF capacitor. A broadband transformer could then match a source other than 50 Ω. Our present concern, however, is with the baseband match. The object is to obtain a reasonable match from dc to a higher frequency. The network must take the form of a low-pass filter, consisting only of series inductors and parallel capacitors. These elements are transparent at low frequencies and do not disturb the impedances near dc.

The result of adding a series 5-μH inductor is shown in Fig. 3. This inductor, in combination with the 2000-pF capacitor present in the complex load, forms a second-order Butterworth filter with a 2.25-MHz cutoff. The cutoff was not chosen; rather, it is the result of the constraint that the end capacitance in the two-element Butterworth filter is 2000 pF.

A match can also be realized with third-order filters. Again, consider filter designs that have 2000-pF capacitors at the ends. Two results are shown in Fig. 4. One circuit uses a 10-μH inductor, resulting in a Butterworth filter with a cutoff frequency of 1.59 MHz. The other uses a 2.46-μH inductor for a 1-dB-ripple Chebyshev response with a ripple cutoff frequency of 3.2 MHz.

The nature of the impedance-matching problem is well illustrated by the data in Figs. 3 and 4. The match at low frequencies may be improved with the addition of a single inductor.

¹G. Hall, "The Search for a Simple, Broadband 80-Meter Dipole," *QST*, April 1983.

*Technical Editorial Assistant

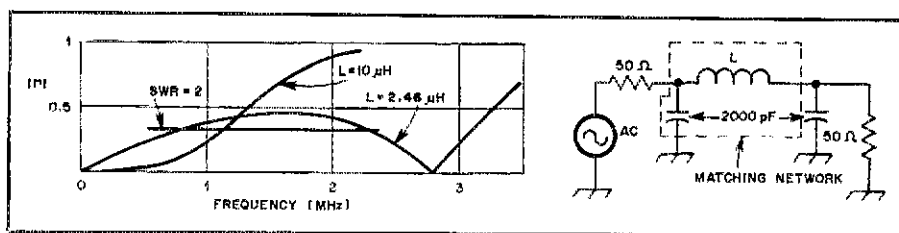


Fig. 4 — Baseband-matching results with third-order filters. See text for details.

or a Butterworth filter with two added elements. A more significant improvement comes with a Chebyshev filter. The match, however, never becomes perfect over a bandwidth that equals that of the unmatched load. Circuit elements added to improve the match at one frequency seem to degrade the match at others.

This is not a new result. It was studied by both Bode and Fano and the result is often known as the "Fano Limit."^{4,5} The mathematical relationship may be paraphrased: *The quality of a broadband impedance match to a complex load is limited. The magnitude of the reflection coefficient may be reduced over part of a band at the expense of reduced bandwidth.*

The Fano limit is a statement of compromise. It is not a failing of science; rather, it is a result typical of others found in science. The laws of thermodynamics and the Heisenberg Uncertainty Principle are both statements that describe the limitations of nature and our ability to observe and control it.

The examples presented used a reactive load with a parallel capacitance. The results would be identical with a series inductance. The matching networks would then be the dual networks to those shown.

Matching the 80-Meter Dipole

With some fundamental knowledge of baseband impedance matching, we can now consider a practical problem — the matching of an intrinsically narrow-band antenna. Hall presented the equations used in his computer studies. These gave the terminal impedance of the antenna as a function of frequency. A little algebra allows these equations to be placed in a slightly more convenient form:

$$Z = \frac{m^{2.736}}{3048} + j \left\{ \frac{m^{2.234}}{549.7} - \frac{120}{\tan(m)} \left(\ln \left[\frac{11232}{f_0 d} \right] - 1 \right) \right\} \quad (\text{Eq. 4})$$

where

$$m = 85.61 \frac{f}{f_0} + 2.34$$

f = frequency in megahertz

f_0 = half-wave resonant frequency of the dipole in megahertz

d = conductor diameter in inches

Although this expression is evaluated easily with a hand-held calculator or a computer, it of-

⁴H. W. Bode, *Network Analysis and Feedback Amplifier Design* (New York: D. Van Nostrand, 1945).

⁵R. M. Fano, "Theoretical Limitations on the Broadband Matching of Arbitrary Impedances," *Journal of the Franklin Institute*, Vol. 249, Jan. and Feb. 1950, pp. 57-84 and 139-154.

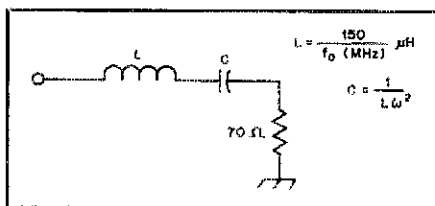


Fig. 5 — A model of a center-fed dipole used for network design. The variable, f_0 , is the half-wave-resonant frequency of the dipole.

fers little intuition about how a suitable matching network might be designed.⁶ Fortunately, the impedance is not complicated near resonance (f_0). The resistive portion of the dipole impedance is nearly constant at 70 Ω. The reactive part is well approximated by the impedance of a series-tuned circuit. The dipole model is shown in Fig. 5. The inductance, in microhenries, is given by $L = 150/f_0$; the capacitance is that required for resonance at f_0 . For example, $L = 40 \mu\text{H}$ and $C = 45 \text{ pF}$ for a 3.75-MHz dipole. The Q of this circuit is ($Q = \omega L/R$) 13.5. Hence, the 3-dB bandwidth is $f_0/Q = 0.28 \text{ MHz}$. The model of

⁶Analyses and designs reported in this paper were done with a hand-held programmable calculator (HP-41CV). The programs used for analysis were expanded from one published earlier (W. Hayward, "General Purpose Ladder Analysis with the Hand-Held Calculator," *RF Design*, Sept.-Oct. 1983).

Fig. 5 was used for the design of matching networks. Eq. 4 was used for the calculation of reflection coefficient.

Comparison of the dipole model with the baseband results provides the information needed to design a matching network. We found that we could not obtain a good match (SWR less than 2) over a bandwidth that was even as wide as that of the load. Hence, for the dipole, it is not reasonable to expect a good match over a bandwidth of more than about 280 kHz. The baseband results did, however, show a reasonable match with networks of either second or third order. A baseband element in a low-pass filter becomes a resonator, or tuned circuit, in a band-pass filter. This is the topology required to match the dipole, which is, itself, a tuned circuit. The band-pass filters must use series-tuned circuits, for that is the form of the model of Fig. 5. The author has described the design of such filters elsewhere.⁷

Fig. 6 presents the match available from the basic dipole (no additional network) as a dashed line. The result of a first try at a matching network is also shown. A second-order Butterworth band-pass filter was designed with the constraint that the Q of the filter end section equals 13.5, the Q of the dipole model. A schematic of the network is shown with the curves. Note that the match close to resonance is improved, but the bandwidth where SWR is less than two has increased little.

The baseband examples show that the bandwidth could be extended at the expense of the match quality, if a Chebyshev filter is used. Fig. 7 shows a matching-network design based on a second-order Chebyshev filter with a passband ripple of 0.25 dB. This network produces an SWR of less than 2 over a 310-kHz bandwidth. The Fano Limit tells us that we won't do much better than this. Note that the match becomes worse than that of the "raw" dipole

⁷W. Hayward, *Introduction to Radio Frequency Design*, Chapter 3 (Englewood Cliffs, NJ: Prentice-Hall, 1982).

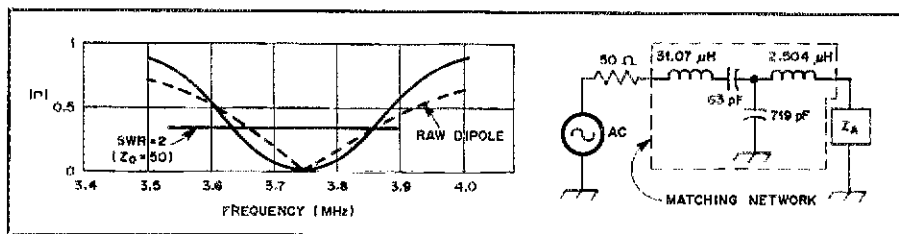


Fig. 6 — The dashed curve shows $|\Gamma|$ for a dipole with no matching network fed with 70-Ω transmission line. The solid curve shows $|\Gamma|$ for the network shown, a second-order Butterworth filter matching a dipole to 50-Ω line. See text for design details.

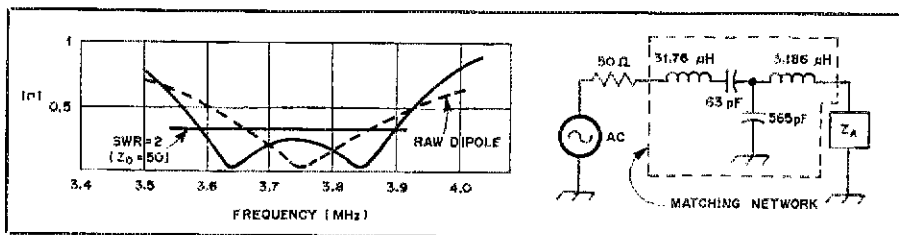


Fig. 7 — The $|\Gamma|$ curve provided by a second-order Chebyshev band-pass filter, with a passband ripple of 0.25 dB, matching a dipole to a 50-Ω line. The dashed curve shows $|\Gamma|$ for the dipole with no matching network and a 70-Ω transmission line.

at frequencies away from the matched region.

Additional Results

Many other examples have been examined. They are only summarized here.

- Third-order filters look promising. A three-resonator Chebyshev filter with a passband ripple of 0.25 dB produced a matched bandwidth (SWR less than 2) of 330 kHz.

- It's not necessary that the dipole be exactly resonant at the center of a matched band. A 3.9-MHz dipole was used as one element of a third-order Butterworth filter tuned to a lower frequency. This yielded a matched bandwidth of 180 kHz centered at 3.6 MHz.

- The matching filters presented in Figs. 6 and 7 were designed to present an impedance of 50 Ω at the input. This is not necessary. A network was designed for an input resistance of 12.5 Ω and then matched with a transformer having a 2:1 turns ratio. The advantage is that

components with more practical values are required.

- All of the networks described would be difficult to use and adjust if installed at the antenna feed point. Examination shows that reasonable results can be obtained with a transmission line between the antenna and the network. The networks are similar to those presented in Figs. 6 and 7 if the line is an electrical half wavelength at f_0 . The networks, however, become significantly different for other line lengths. A quarter-wave line transforms the series resonance of the antenna to appear as a parallel-tuned circuit.

- All cases examined have treated the antenna as a single-ended network. It is actually balanced. A suitable balun would be required in a practical application.

- Although no experimental work has been done, it appears that the networks could be built. Adjustment may be difficult. Use a sweep

generator to drive a return-loss bridge with the antenna connected to the load port and a 50- Ω -terminated oscilloscope attached to the detector port.

The original goal put forth by Hall does not appear practical. The Fano Limit tells us that we will not obtain a match over the entire 80-meter band with a traditional dipole. As Hall suggested, the answer probably lies with other antenna forms. Specifically, we need antennas with significantly reduced Q to obtain a match over a 500-kHz bandwidth, even with special networks. — *Wes Hayward, W7ZOI, Beaverton, Oregon*

Additional Reading:

Matthaei, G., L. Young and E. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures* (Dedham, MA: ARTECH House, 1980).

Cuthbert, Jr., T., *Circuit Design Using Personal Computers* (New York: Wiley, 1983). □

New Books

RF CIRCUIT DESIGN

by *Chris Boswick, WB4UHY. Published by Howard W. Sams & Co., Inc., Indianapolis, IN 46268. First edition, 1983. Soft cover, 8 1/2 x 11 inches, 176 pages including index. \$22.95.*

My keen interest in RF circuit design makes it hard to pass up any new book on the subject. Such was the case with Boswick's book, *RF Circuit Design*. One of the first things I do prior to purchasing a textbook is examine the front matter to learn, if possible, what credentials the author has, if any. I learned that Mr. Boswick is not only a radio amateur (he gets a gold star for that), but he is a product engineering manager and designer for satellite receiving systems and cable TV. He obtained his BSEE from Georgia Tech, and that says something for the man as well.

So, I thumbed through the volume and was pleased to see the in-depth treatment given to some of the subjects that all too often reflect superficial coverage by those who don't have the necessary "savvy" to deal with the topics. There are too many hackneyed technical books on today's market, and if the buyer is not cautious he or she may buy an encyclopedia of technical misinformation. *RF Circuit Design* does not fit that candid description. Rather, it strikes me as a well-written text on some of the RF subjects of prime interest these days to amateurs, technicians and experienced engineers.

I will caution early on that the text does not contain projects with assigned component values. In other words, this is not a handbook or hobby book. There are, however, countless design examples with the pertinent math worked out in progression to illustrate how the parts values are chosen. I have always favored this method of teaching the theory, for it is helpful to those who are weak in the use of equations. For this reason I have always enjoyed the books written by John Lenk, who is active in the Prentice-Hall book stable.

Among the subjects covered in Boswick's book are filter design, transistor biasing, the use of the Smith chart (impedance matching), small-signal RF-amplifier design, RF power amplifiers, resonant circuits and components for RF use. None of these areas are glossed over, as is often

the case with application notes and books that are based on manufacturers' literature and "I guess I know how it works" philosophy. Obviously, the author knows his subject, for the material is presented very well.

The section on modern filter design includes all of the popular designs of the day. There is a table for each type of filter. From these tables the reader can develop component values for the chosen operating frequency. Response curves are also included in this part of the book.

There are two appendixes. Appendix A deals with vector algebra and Appendix B covers the subject of noise calculations. These sections may, by themselves, justify the cover price of the book, assuming the reader is not versed in these subject areas.

I find the book an excellent text as part of my technical reference library. It contains information that I have not found elsewhere in such condensed form — and it is easy to understand! I like to think of *RF Circuit Design* as one of my data books. — *Doug DeMaw, W1FB*

APPLE II USER'S GUIDE

by *Lon Poole with Martin McNiff and Steve Cook. Published by OSBORNE/McGraw-Hill, Berkeley, CA. Second edition, 1983. Soft cover, 6 x 9 inches, 482 pages including appendixes and index. \$17.95.*

The first edition of this guide was reviewed in May 1982 *QST* (p. 14). Since then, the Apple //e computer has established itself in numerous households, schools, small businesses and radio shacks. (At present, nine ARRL Hq. staffers own Apple computers, seven of which are Apple //e's.) Wisely, the authors recognized the need for an updated version of the guide because of the numerous differences — physical and electrical — between the //e and its older cousins.

In the process of updating the book, this edition of the guide has been reorganized considerably for easier use. You'll find expanded coverage of DOS commands, programming, disk graphics, sound and printer use. New program examples show you how to create a mailing list, draw shapes, display bar graphs and pie charts, and compose music. The "Printer Output" chapter has added to it about a page and a half

devoted to the use of some printer control characters with the Epson MX-80.

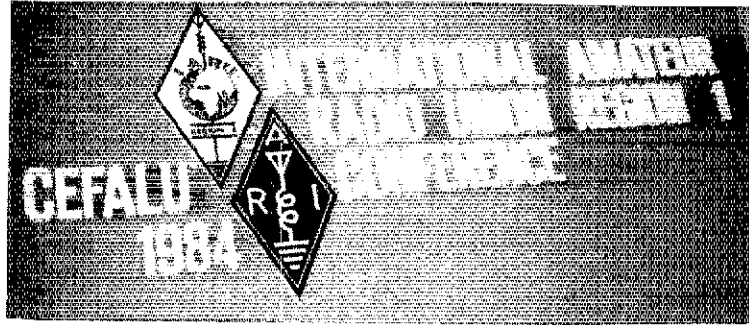
A different type style is used in this edition, and I find it easier to read. The pictures of the monitor screen are larger and more legible than those of the first edition, too. Except for a couple of photos, the external and internal shots of the computer are all of the //e. (If you own an older model Apple, you'll have to look at the first edition of the guide to see photos pertinent to your machine.) A great deal of effort has been placed on presenting information pertinent to the //e without forsaking the older machines.

A couple of minor errors crept into the guide, but they're readily obvious and should present no problem to the reader. For instance, you don't need to use the CONTROL key in the ESC-4/ESC-8 sequence when changing between 40- and 80-column modes on the //e. I did notice at least one piece of information missing. The calculation of HIMEM: during shape table entries is included in the old guide, but missing from this edition.

If you're going to be using your Apple computer for CW or RTTY, you'll want to know the game port I/O connections. These are presented clearly in Appendix F along with the negative decimal addresses of each port. The appendixes comprise 143 of the total number of pages in the book, and are full of useful information: (a) A Compendium of Commands, Statements and Functions; (b) (error) Messages; (c) Program Optimization; (d) Apple //e Versus Other Models; (e) ASCII Character Codes and Applesoft Reserved Word Tokens; (f) Useful PEEK and POKE locations; (g) Built-in Subroutines; (h) Memory Usage; (i) Disk II Format; (j) Conversion Tables (hexadecimal/decimal); (k) Screen Display Forms (used to plan the appearance of the display screen).

The guide is a handy addition to the Apple owner's library. In many cases, it can save you the trouble of thumbing through a half dozen (or more) manuals to find what you're looking for. You can tell this book by its cover: It has a dark green background covered with multicolored apples, and there's a diagonal yellow stripe bearing the title in the upper-left corner. — *Paul K. Pagel, N1FB* □

IARU Region 1 — Cefalu 1984



By Richard L. Baldwin,* W1RU

Founded in Paris in 1925, the International Amateur Radio Union has grown from a fairly loose federation of Amateur Radio societies to a much more tightly structured organization. The member-societies are organized on a regional basis, using the three regions as defined by the International Telecommunication Union, and each year one of the three regions holds a triennial meeting. At these meetings, the members review the progress of the past three years, address current problems and establish or reaffirm the policies that will guide the conduct of amateur societies in the region for the next three years. And, of course, they elect, or reelect, officers and members of an Executive Committee to serve for that period of time.

The sorts of topics that receive long and serious consideration include band plans (in much of the world, the subdivision of the bands by mode is voluntary and generally follows a pattern established by the IARU region); preparation for future ITU conferences that might affect the Amateur Radio Service; contests and other operating activities; harmful interference to the Amateur Radio Service by stations of other services; technical advances that have an effect on the Amateur Radio Service; the administration of IARU, both on a regional and an international basis; coordination between the regions; and the finances of the region.

Prior to one of the regional meetings of IARU, the secretary of the region sends out a call for the meeting and solicits papers on matters of concern. The submitted papers are circulated in advance of the conference so that delegates will be well briefed

on most of the items that will come before the conference. In the case of the 1984 IARU Region 1 meeting in Cefalu, Sicily, Italy, nearly 200 papers were submitted, all neatly indexed and preassigned to one of the two major committees that would review the papers and make recommendations for action to the conference as a whole. IARU Region 1 includes IARU member-societies in Europe, Africa and the USSR.



At a plenary meeting, left to right: Wojciech Nietyksza, SP5FM, vice chairman; Lou v.d. Nadort, PA0LOU, chairman; Eric Godsmark, G5CO, secretary; Heather Norman, secretariat; "Kees" Van Dijk, PA0QC, chairman of the VHF Working Group.

Cefalu

Cefalu, on the island of Sicily, is a resort area where a number of previous IARU meetings have been held. Generally, delegates fly to Rome, and then to Palermo, where a bus or car transports them the remaining 50 miles (80 km) to the site of the conference, the Hotel Club Costa Verde in Cefalu. The Costa Verde is a large

resort hotel with more than adequate facilities for large meetings, and had little difficulty in taking care of the needs of our 150 delegates, many of whom had spouses with them.

The Support by ARI

The success of any conference depends in no small measure on the logistic support that is provided by the hosts or organizers. In the case of Cefalu, we were deeply indebted to the Italian society, the Associazione Radioamatori Italiani, and its president, Mr. Rosario Vollero, I8KRV. Special kudos go to Dr. Salvatore Alescio, IT9AZS, who was in charge of all of the physical arrangements for the conference. He was on the job from early morning until late each night, making sure that all went according to plan. The fact that the conference support was so excellent is a great tribute to Dr. Alescio's organizing ability. One of his right-hand men was Nino Fiore, IT9FWD, who seemed never to sleep! Nino was particularly helpful in escorting delegates through Palermo customs and in locating errant baggage.

Who Was There?

Those who participated in the work of the conference include the following (in each case, the first-named is the head of the delegation): *Italy* — R. Vollero, I8KRV; S. Alescio, IT9AZS; D. Marini, I8CVS; M. Miceli, I4SN; A. Ortona, I1BYH; S. Pesce, I1ZCT; A. Pinasi, I2PKF; G. Tomassetti, I4BER. *Senegal* — J. Bonnafous, 6W1BL. *San Marino* — I. Grandoni, T771; T. Ceccoli, T77C. *Czechoslovakia* — F. Simek, OK1KFW; Z. Prosek, OK1PG; V. Vsetecka, OK1ADM. *Bulgaria* — V. Grozdanov, LZ1VG; E. Zanov, LZ1YD. *Federal Republic of Germany* — P. Lessig, DK3LP; H. Berg, DJ6TJ; G. Blechert,

*President, IARU

DL9TJ; H. Bottcher, DK2NH; N. Gabriel, DJ7ZY; K. Mols, DL9ME; A. Müller, DL1FL; R. Niefind, DK2ZF; M. Ploetz, DL7YC; H. Poelitz, DF7ZH; H. Schilling, DJ1XK; D. Seyboth, DJ2MG. *Denmark* — A. H. Anderson, OZ1AT; B. Bagger, OZ6BL; H. Pyndt, OZ5DX; I. Stauning, OZ7IS. *Faroe Islands* — A. J. Arnskov, OY1A. *Israel* — R. Roden, 4X4ARC. *Iceland* — K. Benediktsson, TF3KB. *Ireland* — C. Hunter, EI9V. *Malta* — C. Fenech, 9H1AQ. *Hungary* — A. Gschwindt, HA5WH; A. Biro, HG5CJ. *Nigeria* — O. Ajayi, 5N0OBA; M. Tunau, 5N9MBT. *Norway* — L. Heyerdahl, LA6A; A. Almedal, LA5QK; A. Gaardso; I. Stokkerud, LA3VV. *Austria* — R. Eisenwagner, OE3REB; P. Maireder, OE5MPL; K. Tiede, OE5TKL. *Poland* — A. Zielinski, SP5LVV; J. Konopka, SP5JC. *Jordan* — M. Balbisi, JY4MB. *Oman* — A. Al-Shahwarzi, A4XJT. *German Democratic Republic* — D. Sommer, Y22AO; G. Damm, Y21WD; K. Voigt, Y21TL. *Union of Soviet Socialist Republics* — V. Bondarenko, UV3BW; B. Stepanov, UW3AX. *France* — J. Hodin, F3JS; P. Cachon, F9UP; S. Canivenc, F8SH; M. Deffay, F3CY; R. Meunier, F6DBH; J. Pauc, F3PJ. *Luxembourg* — J. Wolff, LX1JW. *Great Britain* — R. Hughes, G3GVV; M. Appleby, G3ZNU; J. Bazley, G3HCT; D. Evans, G3RPE; K. Fisher, G3WSN; R. Glaisher, G6LX; G. Shirville, G3VZU; P. Suckling, G4KGC. *South Africa* — U. Dehning, ZS1UD; D. Perry, ZS1CG. *Sierra Leone* — C. Davies, 9L1YL. *Finland* — A. Tigerstedt, OH5NW; R. Ahlbom, OH5NZ; R. Backstrom, OH2BEW. *Yugoslavia* — M. Danon, YU1AU; D. Dobricic, YU1AW; A. Makovic, YU3HI; D. Mrdak, YU1VV. *Sweden* — G. Eriksson, SM4GL; G. Edlund, SM4COD; L. Olsson, SM3AVQ; F. Rasvall, SM5AGM; K. Strom, SM6CPI. *Belgium* — R. Vanmuysen, ON4VY; W. Empsten, ON4ZN; G. Penny. *Andorra* — J. Casal Casal, C31LU; J. Piera, C31LP; J. Pira, C31LY; J. Miguella, C31OB. *Spain* — J. Gene Llagostera, EA3LL; G. Perea Gonzales, EA9EO. *Switzerland* — E. Heritier, HB9DX; M. Cescatti, HB9IN; H. R. Lauber, HB9RG; B. Zweifel, HB9RO. *The Netherlands* — P. Huis, PA0AD; J. Alphen, PA0EHG; S. Fijkdhoorn, PA0TO; A. Dogterom, PA0EZ; J. v.d. Velde, PA0VDV; H. B. Van Dijk.

Also present, as members of the Region 1 IARU Executive Committee, were L. v.d. Nadort, PA0LOU, chairman; W. Nietyksza, SP5FM, vice chairman; E. Godsmark, G5CO, secretary; S. Barlaug, LA4ND, treasurer; M. Mandrino, YU7NQ; J. Rottger, DJ3KR; and H. Walcott-Benjamin, EL2BA. Present as observers were R. L. Baldwin, WIRU, IARU president; A. Shaio, HK3DEU, Region 2 secretary; and M. Fujioka, JMIUXU, Region 3 secretary. Other observers included L. Price, W4RA, ARRL



JARL President Shozo Hara, JA1AN (left), and ARRL President Larry Price, W4RA — both observers at Cefalu 1984.

president; and S. Hara, JA1AN, JARL president.

Present in their roles with various Region 1 working groups and committees were J. Allaway, G3FKM, chairman of the HF Working Group; K. Van Dijk, PA0QC, chairman of the VHF Working Group; R. Broadbent, G3AAJ, secretary of the Satellite Coordinating Group; H. Cichon, SP9ZD, Convenor of the EMC Working Group; R. Strom, IIRYS, Convenor of the Common License Group; and K. Slomczynski, SP5HS, Convenor of the Amateur Radio DF Group.

Also present were Audrey Jefcoate, Region 1 Office Manager; H. Norman, secretariat for Committee A; and J. Morris, GM4AND, secretariat for Committee B.

Additional observers, present at the invitation of the conference, included E. Ramadan, SU1ER; M. Lancellotti, 1A0KM; S. Ibrahim, ST2SA; S. Bchini (Tunisian PTT); W. Binetti (Italian PTT); and M. Sica (Italian Ministry of Defense).

What Did the Conference Do?

Here are highlights of some of the major actions taken by the 1984 IARU Region 1 Conference in Cefalu. (The Conference decisions apply only in Region 1, i.e., Europe, Africa and the USSR.)

1) It urged societies to approach their administrations with the aim of obtaining



The 1984-1987 officers of IARU Region 1 (l-r): Stein Barlaug, LA4ND, treasurer; Wojciech Nietyksza, SP5FM, vice chairman; Lou v.d. Nadort, PA0LOU, chairman; and John Allaway, G3FKM, secretary. (PA0LOU is wearing a medal presented to him by the Radio Sports Federation of the USSR.)

a 50-MHz allocation.

2) It recommended that no FM repeaters be authorized between 144 and 145 MHz.

3) It recommended that the 432-MHz beacon band be defined as 432.800 to 432.990.

4) The conference recommended that there be a concerted effort to urge administrations, particularly those bordering on the North Sea, to assign frequencies for the Syledis radio-location system in other than the amateur 432-MHz band.

5) The conference adopted the so-called Maidenhead locator system, described in January 1983 *QST*, p. 59.

6) It recommended that member-societies formally sponsor and control the setting up and operation of beacons in their countries.

7) It recommended that societies not yet members of IARU should be invited to participate in ARDF championships.

8) It recommended that observers from societies not yet familiar with ARDF be invited to Region 1 competitions.

9) The Conference adopted the principle of sister clubs, so that the growth of Amateur Radio in the developing countries could be encouraged.

10) The life of the common-license group was extended for another three-year period, as it appears that significant progress is in the offing.

11) Region 1 expressed support of the Amateur Satellite Service, and the Region 1 Executive Committee is to search for ways to effect this support.

12) The conference passed a resolution commending ARRL for its many years of service to Amateur Radio and for its intention to serve as the International Secretariat under the new Constitution.

13) Region 1 representatives to the IARU Administrative Council shall be selected by the Region Executive Committee.

14) The Region 1 Executive Committee is to formulate new rules and guidelines for Region 1 Working Groups.

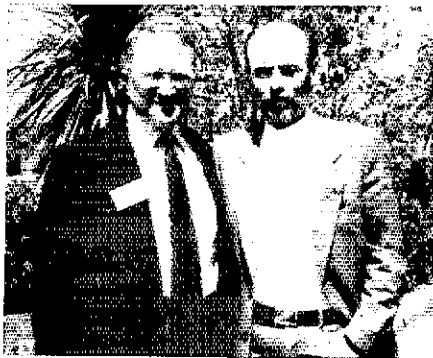
15) In order to facilitate handling, both by machine and human sorters, the conference recommended that the standard size of QSL cards be 9 × 14 cm (approximately 3.5 × 5.5 in).

16) The conference proclaimed June 17 (the national day of Iceland) as a yearly international QRP day.

17) Member-societies were urged to participate both in the work of the Region 1 EMC (electromagnetic compatibility) Group and in their national CISPR (International Special Committee on Radio Interference) bodies.

18) The conference expressed concern at the number of special prefixes in use, and recommended that future use of special prefixes be kept at a minimum.

19) The conference rejected any change to the traditional RST reporting system.



Dr. Salvatore Alescio, IT9AZS, was the spark plug who kept things running smoothly and who obviously has a flair for organization. That's W1RU to the left.

20) All IARU member-societies were urged to adopt the standards of CCIR 476-3, so that AMTOR could have an international standard.

21) For ASCII, the conference recommended that the minimum specifications for the signaling format should be 1 start bit, 7 data bits, 1 parity bit and 2 stop bits, with parity to be even or indeterminate.

22) The conference adopted the principle of having official observers at future conferences, with appropriate rules to be formulated.

23) It was recommended that news bulletins on any mode not be transmitted on 10 MHz.

24) The question of the use of modes other than CW and RTTY on 10 MHz was referred for further discussion at a future meeting of the HF Working Group.

25) It was recommended that all contests be reduced from 48 hours to a maximum of 24 hours, and that the CW and phone portions be limited to a single weekend.

26) The RSGB offered to act as coordinator among Region 1 societies interested in conducting propagation studies.

27) Procedures were adopted for the playing of national anthems and the raising of flags during the awards ceremonies at ARDF championships.

28) There is to be an IARU event, with final choice by the Region 1 Executive Committee, known as the G2BVN Memorial (the late Roy Stevens, G2BVN, was the longtime secretary of IARU Region 1).

As stated earlier, these are highlights. A number of other actions, more specialized in nature, were also adopted. They will be published in detail in the official records of IARU Region 1.

What we have attempted to do is show you the range of the decisions taken by the conference. We want to emphasize the far-ranging scope of the discussions during the conference, both formally and informally, on such subjects as intruders in the amateur bands and how best to solve the problem, encouragement of the growth of Amateur

Radio in the developing countries, the proposed changes in the structure of IARU, representation of the Amateur Radio Service at international telecommunications conferences, liaison with the other two IARU regions, and how to make best use of the amateur allocations. Region 1 has an extensive mix of languages and cultures, which makes a week-long conference such as this not only a challenge but a great opportunity.

Elections

As the conference came to a close, it was time to choose the team who would serve as the leaders for the next three years. Lou v.d. Nadort, PAØLOU, was challenged by R. Eisenwagner, OE3REB, but was reelected to another term as chairman. Wojciech Nietyska, SP5FM, was opposed by Philipp Lessig, DK3LP, but also won reelection for another term as vice chairman. Eric Godsmark, G5CO, who had served as secretary since the death of the late G2BVN, was defeated by John Allaway, G3FKM. Stein Barlaug, LA4ND, was unopposed as treasurer, and so continues for another three years. In the voting for the remaining three seats on the Region 1 Executive Committee, Mirko Mandrino, YU7NQM, H. Walcott-Benjamin, EL2BA, and Rosella Strom, I1RYS, were victorious.

In his remarks after the conclusion of the election process, PAØLOU paid high tribute to Eric Godsmark, G5CO. Eric had agreed to serve as secretary after the death of G2BVN, during a time when there were not only the customary duties within Region 1 but also the added responsibility of participating in the restructuring of the IARU. Eric once told this writer that when he agreed to take on the responsibility as secretary, he was told that it would only require "a touch of the tiller from time to time." In fact, Eric found that he was obliged to hang on to the tiller with both hands during much of the time!

John Allaway, G3FKM, is well-known not only in Region 1 but also worldwide. He has twice served as president of the Radio Society of Great Britain, writes the monthly DX column in RSGB's *Radio Communication*, is a member of the DXCC Honor Roll, and has traveled extensively on behalf of Amateur Radio. In Region 1, he has served as the chairman of the HF Working Group.

In other election news from the conference, the following were elected to the posts indicated: DJ6TJ, chairman of the HF Working Group; PAØQC, chairman of the VHF Working Group; SP5HS, Convener of the ARDF Working Group; DL1FL, Convener of the Common License Working Group; SP9ZD, Convener of the EMC Working Group; OE3REB, Convener of the PADC Working Group; and HA5WH, Convener of the Satellite Coordinating Group.

After a spirited campaign among those who wanted to host the IARU Region 1 conference in 1987 (Malta, Spain, Belgium and The Netherlands), The Netherlands emerged as the winner.

On the Social Side

The conference opened on Sunday, April 8, and closed on Friday, April 13. During the opening ceremonies the delegates were addressed by PAØLOU, I8KRV and W1RU, and by the Mayor of Cefalu, the President of the Sicilian Region and Mr. Giuseppe Avellone, under-secretary of the Ministry of Post and Telecommunications of Italy. Monday evening there was a reception hosted by IARU Hq., and on Wednesday evening a reception hosted by the Deutscher Amateur Radio Club. On Tuesday evening there was a party in Termini Imerese, hosted by the city officials. On Thursday (which is traditionally free of meetings so the secretariat can get documents ready for the final plenary meeting) we were bundled onto buses at 0700 and off we went for a day-long tour of Sicily. Day-long? We got back to the hotel at 0230 the next morning. During the day we visited a vineyard and some ancient ruins at Selinunte, and were hosted at a gala luncheon and at an even more gala dinner. It was quite a day, and served to emphasize the graciousness of our Italian hosts, both amateur and nonamateur.

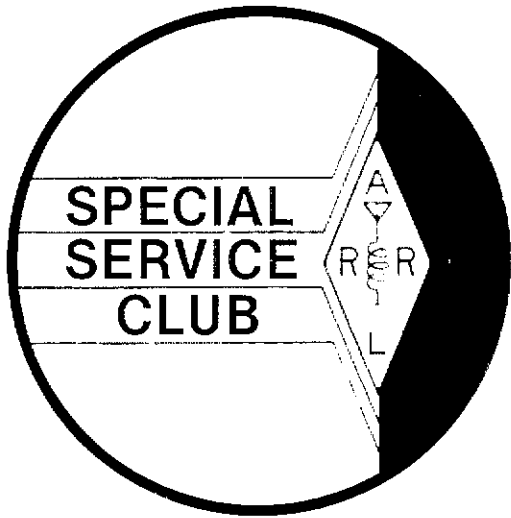
In Conclusion

IARU was founded in Region 1, albeit through ARRL leadership. The first regional organization was in Europe. IARU Region 1 has an extensive system of Working Groups to deal with various aspects of Amateur Radio. The headquarters of the International Telecommunication Union is in Switzerland. Most of the major telecommunications conferences are held in Europe. For these reasons, and more, the International Amateur Radio Union is taken very seriously in Region 1. The societies of Region 1 send large delegations to the Region 1 meetings. They support Region 1 with substantial dues payments. They support Region 1 with their active participation in its work to a degree that could be a model for the rest of the world. And it should be.



Discussing the day's events are (l-r) Region 2 Secretary Alberto Shaio, HK3DEU; ARRL President W4RA; and IARU President W1RU.

SSC Logo Winner Unveiled



Competition was stiff, but we now have a new Special Service Club logo.

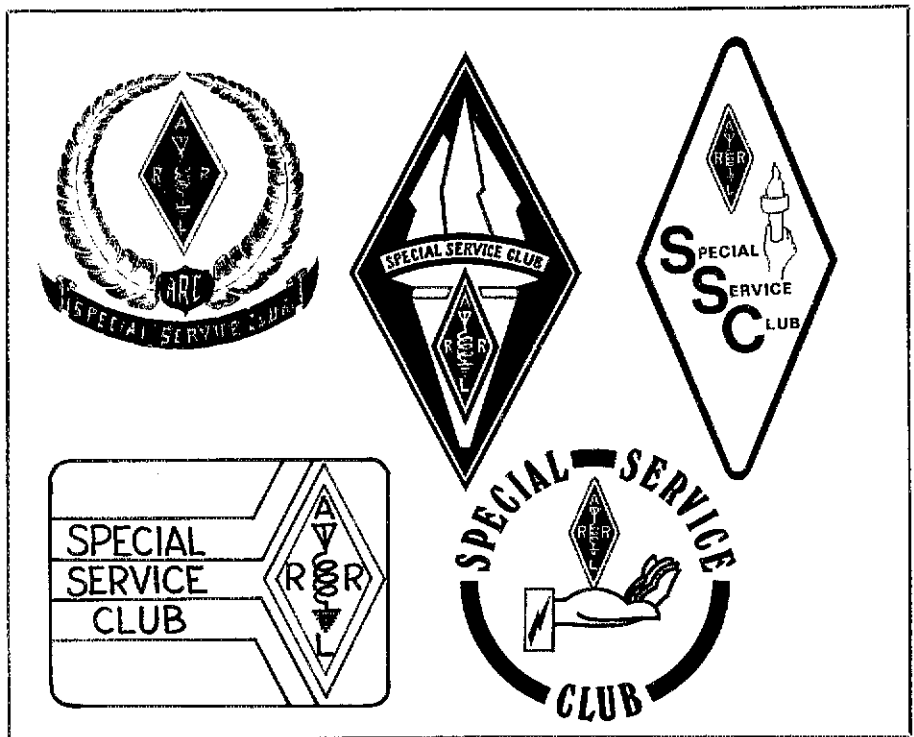
By Sally O'Dell,* KB1O

In November of last year, all members of the League were invited to participate in a contest: Create a design that would symbolize the work of Special Service Clubs furthering Amateur Radio in their communities. The guidelines stated that (1) the logo must express superior achievement yet still be aesthetically pleasing; (2) the ARRL diamond must be in a prominent location; (3) the words "Special Service Club" must be spelled out; and (4) the design must be legible when reduced.

All entries were sent in to ARRL Hq. before the January 15, 1984 deadline. Seventy-seven designs created by 32 different artists were submitted anonymously to the Membership Affairs Committee of the ARRL Board of Directors for preliminary screening and to the entire Board for the final decision. After lengthy debate at the March Board Meeting in Hartford (see Minute 69 in May *QST*, page 60), a winner was named: Jeffrey Duquette, K1BE, of Southwick, Massachusetts, submitted the winning design that will represent the SSC program. (Another of his designs was chosen as a runner-up.)

The logo is available as clip art, an embroidered jacket patch, an adhesive-backed sticker and a decal. Only members of Special Service Clubs are authorized to wear the emblem and to use it on QSLs, newsletters and stationery. All items may be purchased from ARRL Hq. by authorized representatives (the club ARRL liaison or another club officer) of Special Service Clubs. (Please refer to the order form elsewhere in this issue for prices.)

Congratulations to all the entrants for



The five runner-up designs (clockwise from upper left): created by Roy Blackshear, KH6BAI (Keaau, HI); created by Mike Bokulich, K8US (Amherst, OH); created by Mike Lowden, N9CRA (Crestwood, IL); created by Jim Talcott, N6JSV (Santa Ana, CA); created by K1BE.

their fine work, but especially to Jeff and to the other artists who submitted runner-up designs: Roy Blackshear, KH6BAI, of Keaau, Hawaii; Mike Bokulich, K8US, of Amherst, Ohio; Mike Lowden, N9CRA, of Crestwood, Illinois; and Jim Talcott, N6JSV, of Santa Ana, California.



Jeffrey Duquette, K1BE (right), accepts a plaque from Section Manager Don Haney, KA1T. The plaque recognizes Jeff's winning design in the SSC logo contest. (ACT photo)

*Club Program Manager, ARRL

Amateur Radio and Cable TV: A Workable Concept

By Gary Eldridge,* KC8UD

It's common knowledge that the amateur community hasn't always seen eye to eye with the cable television industry when it comes to sharing frequencies. In fact, the two services continue to search for ways to resolve interference problems stemming from their unique on-the-air relationship. However, the members of the Kettering (Ohio) Medical Center ARC have found a way — on the local level, at least — of developing a cooperative spirit between the two services, by working together toward a common goal: serving the public.

It happens regularly in the form of a one-hour program called *Amateur Radio Spectrum*, aired by three cable television companies to viewers throughout the Dayton area. In fact, it occurs several times each month, and the two services share several frequencies with each other.

Amateur Radio Spectrum is taped then replayed several times during the month, until the next live program airs. People south of Dayton are able to view the program on Continental Cable Channel 13; north of Dayton, it can be viewed on Viacom Cable Channel 30. A tape delay of the program also plays on yet another cable system that serves many outlying communities. More than 18 cities and townships in southwestern Ohio are within the viewing area of the three cable companies.

Although the content of *Amateur Radio Spectrum* caters primarily to radio amateurs, others are encouraged to tune in. In addition to Amateur Radio, the program discusses several areas of interest to the general public, including computers, modern communications technology and electronics.

Since the program is live, questions can be fielded by the speaker at the conclusion of the presentation, not only from the studio audience but from the viewers at home as well. The viewing amateurs call their questions in on one of the three repeaters operated by the KMC ARC during the program, and they are answered live over the television by the guest speaker. For the nonhams who are watching, and for the hams who don't have 2-meter or 220-MHz capabilities, a telephone line is provided for

them to call in their questions.

A typical program begins with a videotaped montage of antennas, ham shacks, repeater installations, hamvention scenes and Field Day activities, all put to some snappy music. The camera then becomes "live" in the studio, and someone greets the viewing audience and gives announcements of interest. Sometimes, members of other radio clubs are present to direct announcements pertaining to their groups.

The program continues with a presentation by the guest speaker, followed by a question-and-answer session. The program closes with Amateur Radio news reported by an on-camera anchor and, occasionally, an on-location feature that was taped prior to the live program. All this usually makes for a solid one-hour program. The concept seems to work so well that there is talk of developing a weekly Amateur Radio class for cable television with a similar format incorporating the live interaction with the viewing audience.

Why has this program been successful? One reason is that it was something we knew we could do. As it turned out, the Miami Valley Cable Council (southwestern Ohio) was in-

terested in more programs to fill out their weekly schedule. The fact that it is a live program and that the cable company may use it as they please (as far as rerunning it on videotape), were good selling points. The program costs them nothing, so how could they refuse it?

Another reason for its success is the equipment at hand with which to produce the program: The television facility at Kettering Medical Center has state-of-the-art broadcast equipment. In addition, two of the club's members are video professionals in the Medical Center — one is an engineer and the other a program producer/director.

All 19 members of the KMC ARC are involved in the production of *Amateur Radio Spectrum*. As a result, they have learned about TV production, including how to operate cameras, audio-mixing and video-switching consoles, and lighting equipment. Almost any club, with a little experience and some equipment, could successfully produce similar programs, which most cable companies crave.

Amateur Radio Spectrum even got the jump on some of the major television networks with its very first show, on November 3, 1982. (It was a week later that Dr. Jerrold Petrofsky, of Wright



(KC8UD photo)

*3219 Mirimar St., Kettering, OH 45409

State University, made national headlines from Dayton when his computer-controlled assistive device enabled Nan Davis, a paraplegic, to walk for the first time in four and a half years.)

On that show, Dr. Petrofsky, NØAQM, and his associate, Dr. Roger Glaser, K2SAY, presented the inside story of their work and the technology being used.

The very next week, television news crews from all over the world came to record Dr. Petrofsky's story. We couldn't help but sit back with a smile knowing we have common ground with this miracle worker and that we'd already heard the story from the source. The hams had done it again!

Gaining Access to Cable TV . . .

There are several reasons for using cable TV. One is that it is an excellent public relations outreach for Amateur Radio, and may help develop interest in the hobby. It's also a great way to keep your amateur community informed.

Another benefit is that it is a good way to pull radio groups together to work on a joint project. Don't try to do it all yourself. Allow some room for other groups to take part and to help out. Later on you'll appreciate the added support.

One of the major benefits of cable TV is that it will cost your group nothing to air your program, whereas air time on other broadcast stations is usually out of a club's financial reach and is just not practical.

Gaining access to cable TV, many times, takes only a simple telephone call to the community cable-access coordinator. Better yet, present a written summary of your proposed program, stating the goals you wish to accomplish and your projected audience. If possible, make a pilot show to give them as a sample. Not only will that be good for the cable coordinator to see, it will give you a good idea as to what is involved in making the program.

With many electronic manufacturers participating in the video revolution, there are a variety of consumer video products on the market that are more affordable now than a few years ago. Chances are, someone in your group already has some basic equipment, such as a video recorder and a camera. That's good enough to tape your pilot show with. You don't need to be too concerned with the overall quality of the product at this point; that will come later.

. . . And Making It Work

Planning is perhaps the most important step to ensuring your program's success. How long your show should be may be dictated by the cable coordinator and the amount of time available on the cable channel. But if you do have a choice, consider this very important point: You must have enough material to keep the audience interested.

Kettering Medical Center ARC Cablecast Project

Purpose

To present live programs of interest to the public (Amateur Radio operators in particular) with topics relating to Amateur Radio, computers, modern communications technology and electronics in general.

Goals

To present this information to the public (be it licensed radio amateurs or interested onlookers) on a monthly basis in hopes of creating new interests in the hobby of Amateur Radio and preserving a sense of usefulness in public service.

To inform all interested parties as much as possible of state-of-the-art technologies.

To be interactive with the viewing audience by means of Amateur Radio and telephone contact during live shows.

To disseminate information on affiliated clubs in the area.

Use the same format for each show, with many of the same people on camera. It's good to have a familiar face on the screen. That doesn't mean that other people can't participate once in a while, but have a regular host or two. Then, of course, you may have a different guest each time presenting an entirely different topic.

Whether your show will be live or taped depends largely on where you choose to produce your show and if the assigned air time coincides with your club's schedule. A live show will almost have to be done at the cable facilities, unless you have a direct feed to the cable system. Also, a live show will allow for interaction from your viewing audience, if that is desired.

Portability is one advantage of a taped show. Take the equipment with you on a field trip or out on a Field Day exercise. Another advantage of taping your show for a later broadcast, rather than airing it live, is that there is far less stress and scrambling at the last minute. More than once we have sat watching the clock and chewing our fingernails while waiting for our featured guest, who arrived only minutes before air time.

Your show will only be as good as the material presented. So, when seeking a topic and a guest speaker, choose someone who addresses the camera well and sounds good. Don't seek perfection, but remember that some people do it better than others.

You should have little problem in finding enough topics to cover. Look around in your own club and find out who is doing what. Get someone to do a show-and-tell on their latest homebrew items. Maybe others are using a home computer for CW and RTTY. Let them demonstrate it and share the programming with the audience. Look to people in other nearby clubs to present some facet of Amateur Radio, such as slow-scan TV, satellite communications or packet radio. Whatever you choose, keep in mind that you need to get your audience's attention and keep it.

Most manufacturers of Amateur Radio

equipment, or other related companies, are more than happy to send a representative to appear on your program. But watch out. Commercial advertising is frowned upon by the cable councils, so make sure that your guest speaker knows that equipment may be demonstrated but no commercials are allowed.

Another source of program material is service organizations, such as the Red Cross and Civil Defense. These groups are usually more than willing to contribute, and it's a good point at which to expose viewers to the Amateur Radio tradition of public service.

As mentioned earlier, you can get by very nicely by using a consumer-type video recorder and camera to tape your show; however, if you go with a live show, you will most likely be using the equipment at the cable studio. This may take a little time to become familiar with it, and some practice for the camera operators to coordinate their efforts with the director may be required. The cable council will be happy to instruct you in the operation of the equipment, and may even aid in the production of your show.

Many cable councils have industrial-grade ¾-inch U-matic tape equipment to lend out for just such projects. Again, they will show you how to use it. That's a good source of equipment; it costs you nothing, and the quality is far greater than with most home units.

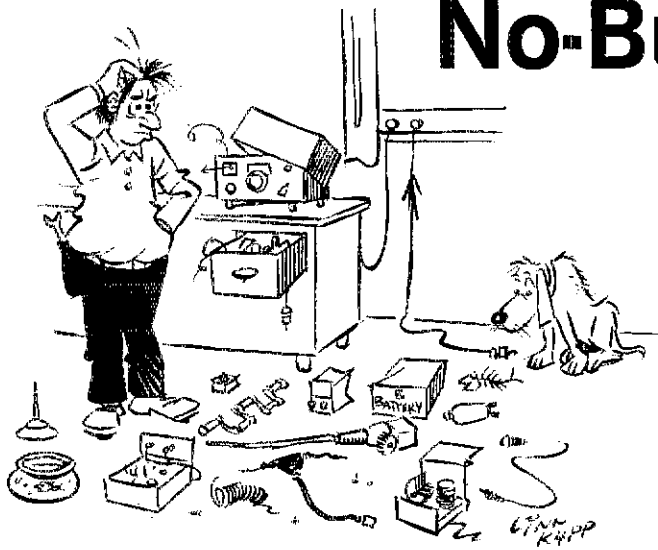
As a part-time producer and director, you may find that a weekly show is a bit much to put on. A monthly show seems to work out nicely in connection with a club's monthly meeting. If the cable council wants a weekly show, they can simply replay a tape of the show three times for the rest of the month, until a new show is ready for air. You may be pleasantly surprised to learn that you don't have to be a television professional to get your club on the channels.

The outcome is rewarding, satisfying and educational for all involved. Perhaps at some time, when enough clubs are involved in the production of their own cable TV shows, a network of shows could be traded from club to club, city to city. We've enjoyed the friendships gained from working with several other radio clubs and the cable council in our city, and enjoy the good comments we receive from our viewers.

With some careful planning and a little work, you'll find that producing your own TV show can do wonders for Amateur Radio in your community, and also keep unity in your club with everyone working together.

At the time of this writing, Gury Eldridge, KC8UD, was vice president of the Amateur Radio club at the Kettering (Ohio) Medical Center, where he is a media specialist in television for medical education. He is also a health/medical reporter for the NBC affiliate in Dayton. A radio amateur for about 13 years, Gary was a member of the film crew for Amateur Radio's Newest Frontier, the League's promotional videotape highlighting WSLFL's historic Amateur Radio operation from space.

No-Budget Hamming



With some ingenuity and a bit of scrounging, you can slash the cost of building that first amateur station.

By Michael E. Moon,* KA7QZK

If you're thinking about getting into Amateur Radio (or *back* in, as was the case with me) but are put off by "all the expense," this is the article for you. My wallet is as thin as a wicked stepmother's soup, but I didn't let that keep me from getting on the air.

You don't need to be a millionaire, or even a "thousandaire," to enjoy the benefits of Amateur Radio. In fact, you don't even need to be a hundredaire. And I'm living proof. In two months of Novice operation, I have worked hams in 20 Western states and three Canadian provinces. On a good night I'll "land" anywhere within a 2000-mile radius, and I'm convinced that with a better antenna (I'm working on it) and some patience, I have every chance of earning the Worked All States award.

And here's the kicker: My total expense — and I do mean *total* — is the grand sum of \$88.40! When I calculate the number of hours I've spent in pure enjoyment, the cost-per-hour of Amateur Radio is lower than the cost of reading a book from the public library.

Now, don't get me wrong. I'd like to have one of those whistles-and-bells, 14-memory, triple-VFO transceivers as much as the next guy. But my philosophy has always been this: You don't need an ocean-going yacht to enjoy a good afternoon's fishing.

No Excess of Money

Our QTH is a log cabin, set in the mountains of western Montana. The XYL and I built it ourselves with a saw, an axe and

our own four hands. We have neither telephone nor electricity. In fact, we don't even have running water, and we get heat from and cook with solar energy stored in the form of wood.

There *are* many amenities — that's why we live here — but an excess of money doesn't happen to be one of them. So when it comes to Amateur Radio, I have to scrounge. I've been gradually working that activity into a high art form.

It all started last winter, our first in the little cabin. We got to thinking: What if we got snowed in for a month or two? The XYL was pregnant with our first "harmonic" by this time, and people on the outside tended to worry about us. We discovered that, from time to time, it would sure be nice if we could somehow get a message to the outside world.

I first considered smoke signals and carrier pigeons, but realized that the first used too much wood and the second used too much bird seed. Then, my thoughts drifted back to the days of my youth, as a Novice ham. I could remember chatting with people all over the country, and all I had was a two-tube transmitter, an old Hallicrafters receiver and a homemade dipole antenna.

When spring came, I drove the old truck to town and bought an inexpensive, general-purpose receiver. I recommend this route for anyone who is just starting out. Mine was on sale for \$79.95 — a big bite, I admit; but I think a prospective ham should get the best receiver he or she can afford. The only reason I bought a new one was that I had forgotten about the used equipment listed in the Ham Ads of *QST*; I had also forgotten about hamfests and radio clubs.

I hooked up my new receiver to the bat-

tery of the truck, and began listening to broadcast stations all over the world. In addition, I began practicing my Morse code by listening to hams around the country and trying to write down what they were "saying." I was amazed at how fast my code abilities came back, but I was even *more* amazed at the improvements made in electronic gear during my absence from Amateur Radio. My new receiver was half the price of my original Hallicrafters (not even considering inflation), but it was half the size and about one-tenth the weight, used a mere trickle of 12-V dc and delivered twice the performance!

King of the Scroungers

Well, I was hooked. I learned that a local radio club was offering Novice classes at no charge, so I signed up. I diligently studied my code and brushed up on my theory using ARRL's *Tune in the World with Ham Radio*. The lady who drives the county bookmobile found it for me, and I borrowed it for the duration of the class.

Speaking of class, there's a story in that book (originally in *200 Meters and Down* by Clinton DeSoto) about the "son of a laboring man in extremely reduced circumstances" who nevertheless built his own rig from scratch — and a pretty sophisticated rig it was, too. He even built his own vacuum tubes using tungsten from burned-out light bulbs and glass from broken test tubes. Now *that's* scrounging!

But even that boy had help from fellow amateurs. He built a mercury-vapor pump to create the vacuum in his tubes, but he had to beg another amateur for the mercury. Which brings up an important point: If at all possible, *join a local Amateur Radio club*. It's full of friendly and helpful

*Star Route Box 346, Greenough, MT 59836

operators. In addition to the help they can give you, it's just plain fun to share this hobby with like-minded enthusiasts. For example, one of our club members, Lance Collister, WA1JXN, recently made history by becoming the first amateur to talk with NASA Astronaut Owen Garriot, W5LFL, in the Space Shuttle *Columbia*. Our club, the Hellgate ARC, is mighty proud of him.

Another advantage of club membership is that the more-experienced hams can help guide you in the choice of used equipment. A tremendous amount of equipment is available at reasonable prices, but a neophyte might be better off to trust the judgment of someone more experienced.

Although I live outside of town and understandably couldn't attend every meeting, club members knew I was on the lookout for a good, used rig. Finally, two guys — one a Technician and the other an Advanced — located a perfect Novice setup for me.

It was an "off couple" — an old Eico three-tube transmitter and a used, general-coverage receiver. Total price: \$75. The receiver was better than the one I already had, so I sold my original little gem for \$69 (it was still in mint condition), coughed up the extra \$6 and bought the used rig.

Next came the problem of getting an antenna. After studying the matter, I recalled that my sister had given me an old electric clothes-dryer that no longer functioned. I removed its electric motor, split the motor's case, and began unwinding the magnet wire within. Several breaks and splices later (remembering to scrape off the lacquer insulation before making a splice), I had acquired almost 1000 feet of antenna wire.

Choosing a resonant frequency was easy. I owned only one crystal, which transmitted at 3720 MHz in the Novice portion of the 80-meter ham band, so I cut a long-wire antenna, calculated to be $3/2$ wavelengths of that frequency. I then strung the resultant 390 feet of wire from tree to tree, hanging it as high as I could reach from a homemade ladder. For hangers, I used fence staples insulated with electrician's tape.

Now, my antenna is only about 20 feet above the ground, and the wire is awfully light. I have no idea what its SWR might be, but I do know that it "loads up," has survived several winter storms and "gets out." And that's good enough for me.

Since then I have scrounged two 40-meter crystals, and have made the delightful discovery that my antenna will also load up on 40. Nevertheless, most of my contacts have been on 3.720 MHz. I enjoy the 80-meter band, and its stable conditions have allowed me to make many friends over the airwaves. And I've found that some of *them* are also "locked on" to 3.720, running old crystal rigs just like mine. So I'm not the *only* "no-budget" ham out there!

Maybe someday I'll build a VFO so I can wander up and down the band a bit. But for now I'm having a ball with what I can do.

Knowing Theory Helps

The thought of building something brings up another point — one of the main advantages to the no-budget style of hamming: First I have to learn the theory. Since some used components inevitably won't be quite up to snuff, I need to understand enough theory to troubleshoot the circuit as well as to build it in the first place. But this understanding of the theory probably doubles my sense of self-satisfaction. I have a notion it might help when I commence to upgrade my Novice ticket, too.

As it stands right now, my three-tube transmitter requires 60-cycle ac. To acquire that special (at least to me) stuff, I've been using a small gasoline-powered generator. For me, every day is Field Day. I need to get away from 60-cycle ac, and that means getting away from vacuum tubes.

I know I can recharge batteries using the sun, the wind and the falling water already at my disposal, so I obviously need to go solid-state and utilize batteries. Once again I'm being forced to learn the theory — this time solid-state theory — and I'm delighted.

Now, I'm building a little VXO-controlled, QRP transmitter I found in the ARRL *Radio Amateur's Handbook*. By scrounging some of the parts, I estimate its total cost will be \$35. When I get it running, I'll sell my old three-tube job to an up-and-coming Novice in the club (somebody who already *has* electricity) and recoup most of my expense. I'm also building a Transmatch (total investment thus far is \$6.95), as well as a receiver audio filter (total cost \$10).

All of the above leads to another important point: I strongly recommend the purchase of an ARRL *Handbook*. A real purist could probably find all the information he needs in the local library, but for me the *Handbook* has been indispensable. The text characteristically assumes you are trying to squeak by as inexpensively as possible, and it is always quick to point out the least expensive way. For example, it almost immediately paid for itself when it told me the Chesapeake and Potomac Telephone Company of Maryland was giving away old telephone coils for use in audio filters.

The same goes for membership in the ARRL. The cost-cutting tips in *QST* have justified my investment, not to mention all the other services I receive.

Living the low-budget life of a modern-day homesteader, I prefer to concentrate on my advantages rather than my problems. Sure, I don't have much money and equipment, but I have lots of room for antennas. And I have no neighbors to complain about TVI. And my receiver

never hears any city-made electrical noise. So I've got it made!

One final note: Our family concern about wintertime communications almost became prophetic recently. At our QTH, we spent a full week at -50° F — and that's on the thermometer, not just wind chill. When it finally reached -60° , I sent out a message. Through the kind ministrations of KB7AM, of Proctor, Montana, I was able to tell my father in Missoula that we were okay but we might not make it out for Christmas. The following day my father predictably arrived, via four-wheel-drive, with a "Santa Claus care package" of needed supplies. Sure, we could have *survived* without them, but they sure brought us some Christmas cheer!

That's behind us now. The meadows are filled with flowers and the creeks with rushing snowmelt. And me? I'm off to town to scrounge more parts. □

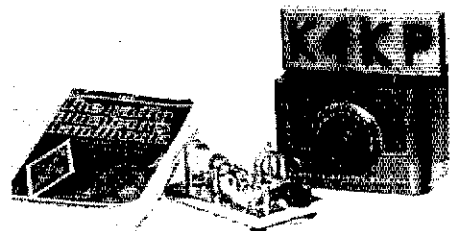
Strays

WANTED: ELMER-OF-THE-YEAR NOMINEES

□ Nominations for the 1984 Elmer of the Year award are being sought by the Northern New Jersey Chapter of the QCWA. Nominations may be made by any licensed radio amateur in northern New Jersey, and eligible candidates must be licensed amateurs who reside in the area. Send your nomination, which should be accompanied by a statement (500 words or less) detailing why the person is worthy of the award, to John J. Brischler, W2SGI, 34 Franklin St., Little Ferry, NJ 07643, tel. 201-641-4251. September 15, 1984 is the deadline for receipt of nominations.

QST congratulates...

□ ARRL Contributing Editor Doug DeMaw, W1FB, of Luther, Michigan, on being appointed to the post of Commissioner for District One, Lake County.



Haskell "Hack" Van Hooser, K4KP, of Chattanooga, Tennessee, was so inspired by a recent QRP article in *QST* (April, p. 52) that he sent in a picture of his homemade 1-W, 40-meter CW rig in a TV booster box. The circuit, which uses a single 6AQ5 tube, was gleaned from the 1939 ARRL *Handbook*.

- *Jamming, Cheating: Subjects of FCC Enforcement*
- *APCO, ARRL Sign Agreement*
- *Goldwater Scholarship Interest Running High*

ARRL Members Will Pick Directors

The ARRL Board of Directors is the body that represents your interests in determining the policies of your League. ARRL Headquarters does not dictate what the League will and will not do; it is you, the member, who determines the direction of League policy through your elected representatives on the Board. This fall, Full members of the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions will choose Directors and Vice Directors to represent their interests on the ARRL Board for two-year terms beginning January 1, 1985.

Get involved in the policy process — come election time, vote!

ARRL Divisions

The policies of the League are established by 16 directors, who are elected on a geographical basis to represent their divisions and constituents on the Board (see page 8 of any *QST* for a list of the divisions, Directors and Vice Directors). These directors serve for two-year terms, with half standing for election in alternate years. Just as in national, state or provincial politics, the voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection, or to decide that other representatives could do a better job and work for the election of those persons. At the same time Directors are elected, Vice Directors, who can fill in when the Director is unable to serve, are also chosen.

Call for Nominations

Nominations are now open for Director and Vice Director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the two-year term beginning January 1, 1985. From now until August 20 at noon, League headquarters will accept nominating petitions signed by 10 or more Full members of a division, naming a Full member of that division as a candidate for Director or Vice Director.

The candidate must submit information (on a form provided by Headquarters) that will allow the Executive Committee to determine the eligibility of the candidate in accordance with the provisions of the Articles of Association and By-Laws, and a statement of not more than 300 words setting forth the candidate's qualifica-

tions. The EC will meet August 26 for this purpose, so candidates should make sure their information form arrives at Headquarters as early as possible, and in any event no later than August 23. The statement will be included with the ballot mailed to members and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee.

The nominee must hold at least a Technician class amateur license or a Canadian Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that division who were in good standing on September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1, and to be valid, must be received at Hq. by noon on Tuesday, November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand, and that for Vice Director will be void. A person nominated for both offices does have the option,

however, of declining the higher nomination and running for Vice Director if he or she wishes. Since all the powers of Director are transferred to the Vice Director in the event of the Director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from headquarters upon request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the ... Division, hereby nominate ... of ... as a candidate for Director; and we also nominate ... of ... as a candidate for Vice Director from this division for the 1985-1986 term.

(Signature ... Call ...
City ... ZIP ... Date ...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

Absentee Ballots

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the U.S., Full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the secretary prior to September 10 giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions, but your *QST* goes elsewhere, please let the ARRL Secretary know as soon as possible, but no later than September 10, so you can receive a ballot

*Deputy Manager, Membership Services, ARRL

for your home division.

The Incumbents

These persons presently hold the offices of Director and Vice Director, respectively, in the divisions conducting elections this year: Central — Edmond A. Metzger, W9PRN, and Howard S. Huntington, K9KM; Hudson — George A. Diehl, W2IHA, and Stephen A. Mendelsohn, WA2DHF; New England — John C. Sullivan, W1HHR, and Richard P. Beebe, K1PAD; Northwestern — Mary E. Lewis, W7QGP, and M. L. Gibson, W7JIE; Roanoke — Gay E. Milius, Jr., W4UG, and John C. Kanode, N4MM; Rocky Mountain — Lys J. Carey, K0PGM, and Marshall Quiat, AG0X; Southwestern — Fried Heyn, WA6WZO and Wayne Overbeck, N6NB; West Gulf Division — Raymond B. Wangler, W5EDZ, and Thomas W. Comstock, N5TC.

Petitions need 10 or more signatures of Full members, and are due at Headquarters by noon August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon November 20. The new term will begin at noon January 1, 1985. For the Board of Directors:

June 1, 1984

David Sumner, K1ZZ
Secretary

HMR COMMUNICATIONS SUIT SETTLED

Eighteen Amateur Radio clubs nationwide will divide \$10,000 to cover losses due to the alleged fraudulent business practices of a Westmoreland County electronics manufacturer, as the result of action by Pennsylvania Attorney General LeRoy S. Zimmerman. The company will also pay a \$1000 civil penalty.

Zimmerman identified the company as HMR Communications, Inc., 10 Communications Way, West Newton, Westmoreland County. An agreement document, signed by Henry M. Robbins, Jr., president of HMR, settles a 1981 suit against the company brought by the state Bureau of Consumer Protection. The suit charged HMR with misrepresenting the company's size, its personnel, the quality of its products and the terms of its warranties.

The agreement — a "Consent Petition" — became effective April 26, 1984 with its filing in Westmoreland County Common Pleas Court. By signing the consent, HMR agrees to pay \$10,000 in refunds to the radio clubs, pay the civil penalty and refrain from misrepresenting the company's products, personnel and policies. HMR additionally agrees to discontinue, for three years, the manufacture and sale of 11 Amateur Radio components the bureau claims don't perform as advertised. Under the terms of the consent, HMR doesn't admit to any past wrongdoing.

According to the Bureau, the \$10,000 refund will be deposited into an escrow account and will be distributed by the Bureau to the following radio clubs proportionally: Lehigh Valley ARC, Allentown, PA; Radio Club of Argentina, Jersey City, NJ; Miami Valley F.M. Assn., Dayton, OH; Western Electric, Columbus, OH; Southwest Radio Society, Dallas, TX; Guadalupe Valley, Sequin, TX; Echo Society, Lake Jackson, TX; Heart of Texas ARC, Waco, TX; Flanagan Amateur Radio Repeater Group, Chenoa, IL; Gurnee Repeater Group, Gurnee,

IL; Iowa Repeater Club, Denison, IA; Messilla Valley Radio Club, Denver, CO; Interstate Repeater Society, Chester, NH; Eagle River Repeater Club, Milwaukee, WI; Boy Scout Explorer Post 296, Albuquerque, NM; Hainer Systems, Swartz Creek, MI; Rosae City Repeater Club, Portland, OR; Richmond Amateur Telecommunications Society, Beaver Dam, VA.

HMR was not a QST advertiser.

In an April 29 release, the company said, "HMR's position is that there was no valid reason for the Bureau's suit, and that the equipment that HMR manufactured was not misrepresented or faulty in any way." It said also that "HMR agreed to the total cost of \$11,000 as a settlement only because the estimated cost of fighting the suit in court was much higher."

2310-2390 MHz BATTLE ESCALATES

The Aerospace and Flight Test Radio Coordinating Council (AFTRCC) has responded negatively to comments seeking retention of an amateur allocation at 2310-2390 MHz filed in General Docket 84-186. The comments, filed by ARRL and the Southern California Repeater and Remote Base Association (SCRRBA), are the latest in a series of attempts to get FCC to overturn its decision to exclude Amateur Radio at the 80-MHz-wide segment in favor of aeronautical flight test telemetry.

WARC-79 provided Amateur Radio with a secondary allocation to the primary fixed, mobile and radiolocation services at 2300-2450 MHz. It was not until late in the WARC implementation proceeding that FCC indicated it planned to exclude Amateur Radio from the 2310-2390 MHz portion of the band. The League commented at both the *Third Notice of Inquiry*, wherein FCC's plan first appeared, and the *Notice of Proposed Rule Making* stages, requesting continuation of amateur access at the segment until such time as technical issues could be considered to determine the feasibility of flight test/amateur sharing.

FCC turned down ARRL's requests, opting for exclusive flight test operations. The League immediately filed for reconsideration stating that no technical analysis had ever been provided to establish the presumed interference between the two services. And, the short period of time between the FCC's third inquiry and proposal stages was inadequate to address these technical issues. The League's bid, as well as one filed by SCRRBA, is still pending at this writing.

Wanting to leave no stone unturned in its fight, the League next filed comments in General Docket 84-186, the Commission's proposal to amend its rules to permit flight test operations at 2310-2390 MHz. The NPRM was released in response to an AFTRCC petition, RM-4077, requesting expeditious grant of rules to allow flight test operations quickly on its new segment. The League took the opportunity to reassert its desire that FCC retain Amateur Radio in the lost segment, stating that AFTRCC and ARRL could effect frequency coordination arrangements to allow sharing. SCRRBA offered similar arguments.

AFTRCC disagreed in reply comments filed April 24 stating also that this docket was an inappropriate forum for the League and SCRRBA comments. The Council said the "true purpose" of the groups' comments was to "urge reconsideration of the Commission's decisions in Docket 80-739," the separate WARC implementation proceeding. AFTRCC further stated that the comments "demonstrate a naive misunderstanding of flight test radio opera-

tions." It rebutted SCRRBA's contention that these operations were generally confined to rural areas while Amateur Radio was primarily urban in nature. "In fact," AFTRCC said, "the urban area in which SCRRBA's members operate — the Southern California corridor — is one of the most heavily used areas for flight testing."

The Council said there is no merit to the ARRL notion that the use of frequencies can be readily coordinated between it and the League. "This proposal ignores the very heavy expected use of the new band by government as well as nongovernment flight test telemetry users," said AFTRCC. "The proposition that individual Amateur Radio licensees would have to be included in the scheduling process is obviously untenable."

The Council concluded that the ARRL and SCRRBA comments should not stand in the way of expeditious implementation of flight test radio operations at the segment.

For background on the League's bid for reconsideration of FCC's WARC decision barring amateurs from 2310-2390 MHz, see *Happenings*, April 1984 QST; SCRRBA's bid is reported in *May Happenings*.

RADIO INDUSTRY FILLS VOID LEFT BY FCC DEREGULATION IN COMMERCIAL LICENSING

The National Association of Business and Educational Radio (NABER) and the National Association of Radio and Telecommunications Engineers, Inc. (NARTE), are taking steps to fill the void left by FCC's recent deregulation moves in the licensing of repair and maintenance personnel to install and repair commercial radio equipment. NABER will certify individuals who pass their examinations. Both organizations provide "grandfathering" for persons with valid FCC commercial licenses. More information can be obtained by calling NABER at 202-887-0920 and asking for the Certificate Program Coordinator, or writing NABER, 1330 New Hampshire Ave., N.W., Washington, DC 20036, or NARTE, P.O. Box 15029, Salem, OR 97309 (501-581-3336).

FCC GRANTS SPECIAL LICENSE FOR ARRL 18- AND 24-MHz ANTENNA DESIGNERS

The Commission has issued ARRL an Experimental Radio Station Construction Permit and License for use during the League's Antenna-Design Competition (QST, March 1984, p. 56). The experimental license grants certain limited privileges to U.S. amateurs participating in the contest. The 100 entrants now have the authority to conduct on-the-air tests of their new antenna designs on 18.073, 18.163, 24.895 and 24.985 MHz. WARNING: This experimental license applies only to registered ARRL Antenna-Design Competition entrants. The antenna competition winners will be announced next January.

REVOCATION PROCEEDINGS BEGUN AGAINST THREE SAN DIEGO-AREA AMATEURS

The FCC's San Diego, California, office is engaged in a continuing investigation of malicious interference to communications on San Diego-area amateur repeaters. As a result, three San Diego area Amateurs — Calvin C. Plageman, WD6DSV, James W. Smith, W6VCE

Are You a Lawyer? Amateur Radio Wants You!

Your legal expertise is needed in the Amateur Radio community to help build and maintain the legal foundations for our hobby. The League has initiated a Volunteer Counsel Program, designed to help stem the tide of overly restrictive regulations on Amateur Radio. You can help. If you have an interest in this exciting area of communications law, are a reputable member of the bar of at least one state and are a League member, please contact us. As a Volunteer Counsel, you will be kept well informed about areas of law affecting Amateur Radio. For further information, write to the ARRL Volunteer Counsel Program, 225 Main St., Newington, CT 06111.

and Anthony DiBona K6PWX — have been ordered to show cause why their amateur licenses should not be revoked.

All three respondents are charged with violating Section 97.125 (willful or malicious interference) of the Commission's Rules. Additionally, Smith and DiBona are charged with violating Sections 97.84(a) and 97.123 (failure to identify), 97.113 (broadcasting) and 97.115 (transmission of music).

The investigation is continuing. Additional malicious interference cases involving San Diego-area amateurs may be initiated in the near future.

— FCC News Release

NEW YORK HAM GIVES UP LICENSES AND PAYS \$600 FINE

Edward L. Johnson, WA2JHU, of Syracuse, New York, has paid a \$600 FCC fine and has agreed to turn in his amateur licenses for a four-month period. Johnson was caught violating FCC Rules by Capt. David A. Stevenson of the Onondaga County, New York, Sheriff's Department. Capt. Stevenson investigated complaints from hams supplying radiocommunications at the 1983 Empire State Games in Syracuse about severe interference. During the investigation Capt. Stevenson tracked Johnson down electronically and caught him violating FCC Rules 97.84 (failure to identify) and 97.113, which prohibits hams from "broadcasting" (transmitting to whoever is listening instead of to particular stations). — FCC News Release

FCC TURNS DOWN LEAGUE BID FOR FEDERAL PREEMPTION STATEMENT

The Commission has denied an ARRL request to extend to amateur antennas a 1983 federal preemption analysis for Satellite Master Antenna Television (SMATV) systems. The 1983 Order preempted local and state regulation of SMATV systems that could interfere with, delay or terminate interstate and federally controlled communications services.

SMATV systems serve residents of private, multi unit dwellings. A typical system consists of a receive-only satellite earth station that provides premium programming signals transmitted to the receive station via satellite, and a master antenna for receiving over-the-air TV broadcast signals. These are combined and distributed through cable to subscribers residing in the multiunit dwellings.

The Society of Private and Commercial Earth Stations (SPACE) created a channel for the League's request when it filed a petition that

FCC issue a policy statement "clearly setting out the limits of local authorities to adopt zoning regulations which interfere with and retard the full development of satellite communications in the home," similar to that offered SMATV services. ARRL jumped on the bandwagon with its own comments on SPACE's petition for clarification; see Happenings, May 1984 QST. ARRL sought a further extension of the Commission's SMATV ruling to bring Amateur Radio under the federal preemption umbrella.

In its news release accompanying the denial order, the Commission noted that its order had dealt with SMATV systems normally used for commercial purposes, serving one or more multiple-unit dwellings. "SPACE, as well as the American Radio Relay League, want remedies which would apply to an altogether different set of circumstances — i.e., receivers and/or transmitters situated on the property of residential single-family homes," FCC said. The agency indicated that federal preemption of residential zoning ordinances is inappropriate in this proceeding. It added that a matter of this complexity should be raised by the petitioners in a separate proceeding "if they can show that local jurisdictions are deliberately 'zoning out' communications equipment to restrict national communications systems, rather than for clearly acceptable purposes of local concern."

SAFETY SERVICE GROUP, ARRL SIGN AGREEMENT

With the common goal of communications in the public interest, the League and the Associated Public-Safety Communications Officers, Inc. (APCO) signed a memorandum of understanding on March 21 in Denver, Colorado. The agreement, signed by then ARRL President Carl L. Smith, W0BWJ, and APCO President Craig M. Jorgensen, establishes a cooperative framework within which ARRL volunteers may coordinate their facilities with APCO members/agencies to the fullest advantage during disasters.

Founded in 1935, APCO is comprised of law enforcement, fire, emergency medical and other public safety communications personnel whose primary responsibility is the management and operation of communications facilities at the state and local levels. APCO welcomes the cooperation and assistance of the ARRL Field Organization in meeting the shared goal of public service through communications.

Within the terms of the memorandum, state APCO chapters may request the ARRL Emergency Coordinator to serve as a volunteer advisor, as appropriate, for emergency communications predisaster planning. When a situation arises that requires Amateur Radio communication, the state APCO chapter concerned may request the assistance of the ARRL officials nearest the disaster scene.

The address of the APCO chapter near you can be obtained from APCO Headquarters, P.O. Box 669, New Smyrna Beach, FL 32070 — Bob Halprin, K1XA

FCC REVOKES HAM'S LICENSE FOR EXAM FRAUD

FCC Acting Chief Administrative Law Judge Thomas B. Fitzpatrick has ordered the Technician class license of Vincent J. Beard suspended, his N2EDW station license revoked and his application for a General class operator license denied. This action came after FCC determined

that Beard had cheated on a General class code test.

On March 23, 1983, Beard appeared at the New York City office to take the Extra and General class code tests. Testimony indicated that after failing the Extra Class code test, Beard was called back into the examination room by FCC Examiner Debra Thomas for the General class level exam. After playing the 13-WPM tape, Thomas handed all applicants the questions and answer sheets. She then observed Beard "looking into his left hand which was cupped and down on the writing surface." She confronted him and found that he had a small card in his hand that contained the answers for all 11 versions of the 13-WPM tests used by the FCC. Additionally, Beard's scratch sheet for copying the 13-WPM tape "was covered with writing but does not show any coherent message on either side."

Beard acknowledged that he had the card in his hand during the exam, but indicated that he had not intended to cheat. He said that while waiting to take the 13-WPM test he had made the acquaintance of another ham named "Bruce" in the waiting room. Beard said that as he got up to enter the examination room, Bruce handed him the card. He only looked at the card after the 13-WPM tape had been completed and then realized what it was. At this point, according to Beard's own testimony, Thomas asked to see what he had in his hand. Thomas terminated the exam and informed Beard that he had failed. He waited 30 days, retested in late April, and passed the 13-WPM code test.

Beard was not able to recall a call sign or last name for "Bruce." No one with the first or last name of "Bruce" or with a middle initial "B" took any amateur or other operator exam in the office on March 23, 1983.

Judge Fitzpatrick concluded that "Beard not only acknowledged that he had the card in his hand but that his actions were of a 'suspicious nature' in that he was looking into his hand at the card when Application Examiner Thomas terminated his examination. Beard's explanation that he was given the card by a stranger called 'Bruce' as he entered the examination room and that he was merely looking at the card to determine what it was after he realized that he couldn't pass the examination is rejected as inherently improbable." Beard had until June 6 to appeal this decision.

DETROIT FCC FIELD OFFICE RELOCATES

The Federal Communications Commission's Detroit Field Office has moved to 24897 Hathaway St., Farmington Hills, MI 48018-1398. The telephone number remains the same: 313-226-6078. Recorded telephone message number: 313-471-0052.

ARRL ATTACKS RADIOLOCATION MANUFACTURERS' ATTEMPTS TO BUFFET LEAGUE 160-METER RTTY PETITION

Two radiolocation companies' comments on an ARRL 160-meter-band petition brought a quick reply from the League. Offshore Navigation, Inc. (ONI), and Racal-Decca (RACAL), manufacturers of radiolocation equipment, filed comments on ARRL's petition to permit F1 RTTY on 160 meters, RM-4774. RACAL commented, "the existing radiolocation spectrum below 1800 kHz is overcrowded and inadequate

Be a Charter Contributor to the Goldwater Scholarship Fund

Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution now and be a *Charter Contributor*. All Charter Contributors will have their name and call listed in a commemorative book to be presented to Senator Goldwater prior to the awarding of the first scholarship in his honor. The deadline for donations by Charter Contributors is August 1, 1984.

If your contribution is \$25 or more, we will list your name and call in *QST*. If your contribution is \$100 or more, in addition to your name and call appearing in *QST*, you will receive a signed photograph of the Senator, suitable for display in your hamshack. And for contributions of \$1000 or more, in addition to the above, we'll put your photo in *QST* and you'll receive a personal thank you call from Robert York Chapman, W1QV, President of the ARRL Foundation, which is administering the Goldwater Scholarship Fund.

We welcome *all* contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being? Please make your check payable to the ARRL Foundation Goldwater Scholarship Fund, and send to ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent contributors of \$25 or more include: Joel Bahr, N9BON; Arlan Bowen, N400; Burlington (NJ) Lodge Number 22 Odd Fellows; Orestes Caballero, N6OC; James A. Carmody; Carozza Family; Carlos and Mary Solera; John Carozza, KA2EFW; Edward Cartotto, W6ZZN; Central Massachusetts Amateur Radio Assoc., Inc.; Wilfred H. Conley; Virgil V. Cowen, W7FNS; H. L. Crispell, W6TZV; John Curry, K5IMC; Woody Fugate, W4JDU; Everett H. Gibbs, W8AQ; Viola Grossman, W2JZX; ARRL Honorary Vice President and Mrs. W. M. Groves, W5NW and W5DUR; R. B. Harris, KW8B; Allan W. Hoskins, W7MHC; Howard M. Hoyt, W2RRC; Ervin Jackson, Jr., N4BIG; George W. Johnston, W6YWH; Arnold King, Jr., W2ZT; Eugene L. Langberg, WA3AKK; Henry R. Leggette, WD4Q; Steve Lund, WA8LLY; Harry A. Maclaren, W5FGO; Charles L. Mercer, K5FSA; George C. Miller, K2FD; Kent A. Mitchell, W3WTO; National Association of Broadcasters; Dan L. Osborne, WB5AFY; Robert H. Ossene, N1AKX; G. Douglas Payne, K5OIT; W. A. Ramsdell, W1FBJ; Mt. Prospect Amateur Radio Club; Walter and Linda Reitz, K4JCA; Harris A. Robinson; George C. Rummel, W1WTF; Robert Savoy, KK3V; Harold S. Schafer, KC9HO; George and Katherine Stannard, KE1D and KA1JKY; Rev. H. J. Sutcliffe, W2MIO; Tonto Amateur Radio Association; Dr. and Mrs. Melvin Warrick, K8WM; West Allis Radio Amateur Club, Inc.

as things now stand; but when radiolocation is displaced to make room for AM broadcasting, the 1900-2000 kHz band will become absolutely critical to meeting important national needs served by radiolocation operations."

ARRL responded by first pointing out that ONI and RACAL are addressing issues that have "nothing to do with the simple, narrow issues raised in the League's Petition." What hams are asking for in this proceeding is for F1 privileges over the entire 160-meter band. "Whatever the future holds for radiolocation relocation after the expansion of the AM broadcast band, it is of no relevance at the present time. There is no dispute that amateurs are actively occupying the 1900-2000 kHz portion of the 1800-2000 kHz band and will do so at the very least for the indeterminate future."

Since ONI and RACAL raised the issue, however, ARRL asserted further that it has not been established that radiolocation will need the 1900-2000 kHz band, even if the AM broadcast band is expanded. The League "does not accept and will not for one second tolerate the presumption of entitlement of radiolocation to the 1900-2000 kHz band." The League's response then footnoted some comments from proceedings pertaining to WARC-79 to support its statements.

The ONI and RACAL comments underscore the fact that radiolocation interests will attempt to acquire 1900-2000 kHz at their earliest opportunity. The band segment remains secure for radio amateurs' use for the immediate future. However, ONI's and RACAL's use of the F1-RTTY petition to lay claim for future acquisition of 1900-2000 kHz is a warning shot of an assault League planners have foreseen.

STAFF NOTES

Headquarters is pleased to welcome Katherine Hevener, WB8TDA, aboard as the new Member-

ship Services Assistant in the Membership Services Department. Her duties will include handling written and phone correspondence on FCC Rules interpretations and other areas, and coordinating the ARRL Program for the Disabled.

"Kitty," a native of West Virginia, graduated from George Peabody College for Teachers of Vanderbilt University in 1981 with a BS in Special Education for the Visually Impaired and Elementary Education. Prior to assuming her post at ARRL, she taught communication skills to legally blind adults.

Kitty was first licensed in 1974, as WN8TDA. She has been active in traffic handling, contesting, public service activities and ragchewing. She has written articles for regional and national Amateur Radio publications. Kitty holds ORS and PIO appointments. In addition to her Amateur Radio activities, she enjoys square dancing, round dancing, singing, playing guitar and Esperanto.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Missouri, Southern New Jersey, South Carolina, Western Pennsylvania, Eastern Massachusetts, Nebraska and New York City-Long Island Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on *that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters, but are not required. The following form is suggested:

(Place and date)
General Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the ... ARRL Section of the ... Division, hereby nominate ... as candidate for Section Manager for this Section for the next two-year term of office

(Signature ... Call ... City ... ZIP ...).

An SM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of Technician class or higher immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, September 7, 1984.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1984. Returns will be counted November 20, 1984. SMs elected as a result of the above procedure will take office January 1, 1985.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1985.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in January *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by appointment by the General Manager.

You are urged to take the initiative and file a nominating petition immediately.

David Sumner, K1ZZ
General Manager

SECTION MANAGER ELECTION RESULTS

The following election was conducted for a two-year term of office beginning July 1, 1984:

Balloting Results: In the Santa Clara Valley Section, Rodney J. Stafford, KB6ZV, received 668 votes and Jettie B. Hill, W6RFF, received 219 votes. Mr. Stafford was declared elected.

SM APPOINTMENT

In the Oklahoma Section, Raymond L. Miller, WSREC, has been appointed to complete the term (until September 30, 1984) of Arthur E. Roberts, W1GOM (resigned).

AIRS UPDATE

While we operate our favorite bands, 25 AIRS stations scattered around the U.S. are keeping a watch for nonamateur transmissions that are causing harmful interference.

AIRS, the ARRL Interference Reporting System, has been operating since the beginning of the year. Over 4500 reports of nonamateur stations in our bands have been entered into the data base at Headquarters. From this input, Hq. has submitted reports to the FCC Treaty Branch regarding SGJ on 7060 kHz, Radio Tirana on 7065 kHz, Radio Moscow on 7100 kHz, LNQ on 14,080 kHz and KRH50 on 14,115 kHz. The FCC has shown its intent to help us fight intrusion into the amateur bands by sending cablegrams to the Soviet Union concerning Radio Moscow on 7100 kHz and UMS on 21,032 kHz, as of this writing. □

Moved and Seconded...

**MINUTES OF EXECUTIVE COMMITTEE
No. 414
May 25, 1984**

AGENDA

1. Approval of Minutes of January 13-14 and March 25 meetings (Nos. 412 and 413)
2. Report on FCC matters
3. Report on local antenna/RFI matters
4. Review of progress on Board directives
5. Requests for additional appropriations for committees
6. Minute 73 (study of simplex autopatches)
7. Minute 99 (study of nets)
8. Minute 104 (study of Board committee structure)
9. Report on Volunteer Examiner Program
10. IARU matters
11. Recognition of new Life Members
12. Affiliation of clubs
13. Approval of conventions
14. Review of National Convention program
15. Date and place of next meeting
16. Cable television interference
17. Conflicts with the nongovernment radiolocation service
18. 220-MHz band plan
19. ARRL prize material for hamfests
20. Obsolete certificate stock

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Incorporated, met at 3:12 P.M. Mountain Daylight Time, Friday, May 25, 1984, at the Holiday Inn Holiday Convention Center, Aurora, Colorado. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Leonard M. Nathanson, W8RC; Directors Lys J. Carey, K0PGM, Paul Grauer, W0FIR, Gay E. Milius, Jr., W4UG, and Hugh A. Turnbull, W3ABC; and General Manager David Sumner, K1ZZ. Also present were Vice Presidents Garfield A. Anderson, K0GA, and Jay A. Holladay, W6EJJ; Directors Mary E. Lewis, W7QGP, and Edmond A. Metzger, W9PRN; Vice Director Marshall Quiat, AG0X; and Counsel Christopher D. Imlay, N3AKD.

1) On motion of Mr. Milius, the Minutes of the January 13-14 and March 25 meetings (Nos. 412 and 413) were accepted in the form in which they appeared in QST.

2) Mr. Imlay reported on FCC matters as follows:
2.1) The long-awaited FCC action on phone band expansion (Docket 82-83) may come prior to the Commission's summer recess.

2.2) The request for a rules waiver to permit WIAW operators to make two-way contacts while on duty, filed May 14, has been denied.

2.3) On May 14, FCC adopted a Memorandum Opinion and Order in which it declined to act on our request made in the form of comments on a petition for clarification filed by the Society of Private and Commercial Earth Stations (SPACE), which sought the extension of a declaratory ruling preempting the regulation of SMATV antennas so as to cover Amateur Radio antennas. The Commission indicated that the issue might be raised in a separate proceeding, if we could "show that local jurisdictions are deliberately 'zoning out' communications equipment for purposes of restricting national communications systems rather than for clearly acceptable purposes of local concern."

2.4) The period for filing comments on RM-4784, the ARRL petition seeking amateur access to the new bands at 24 and 902 MHz, has passed without adverse comments surfacing. The timetable for possible FCC action on our request is not known.

2.5) Final FCC action on Docket 84-265, the proceeding to incorporate cost reimbursement provisions in the volunteer examination rules, may occur by July 12. This would clear the way for ARRL signing of an agreement with FCC to become Volunteer Examiner Coordinator (VEC) in all 13 FCC-defined regions.

2.6) Two firms engaged in providing radiolocation services on a commercial basis filed comments in response to our petition, RM-4774, which seeks F1 emission privileges in the 160-meter band. ARRL Counsel filed appropriate reply comments, pointing out that the gaining of access to 1900-2000 kHz by nongovernment radiolocation was by no means a foregone conclusion.

2.7) To pursue our objective of maintaining amateur access to the 2310-2390 MHz band, ARRL

filed comments in response to an FCC Notice of Proposed Rulemaking which seeks to permit aeronautical flight-test telemetry operations in that band. Our objective is to find a mutually satisfactory sharing arrangement. The Aerospace and Flight Test Radio Coordinating Council has filed a Reply concurring, without much technical support, that no such arrangement is possible.

2.8) On March 20, Counsel filed with FCC a Petition for Expedited Special Relief and Declaratory Ruling requesting that FCC adopt interim RF radiation standards (to limit the possibility of biological effects from RF radiation). The adoption of reasonable and tolerable standards would preclude the adoption of unreasonable standards at the local, state or federal levels. No action on our petition has been forthcoming.

3) Mr. Imlay reported on local antenna litigation as follows:

3.1) *Borowski, et al. v. City of Burbank, Illinois*. Encouraging developments just prior to the meeting suggest that there is a possibility of an early resolution of this case in the amateurs' favor. Counsel Imlay is monitoring the situation closely through the plaintiffs' attorney.

3.2) *Guschke v. City of Oklahoma City*. The *Amicus Curiae* brief authorized earlier is ready for filing, and will be submitted next week.

3.3) *Thernes v. City of Lakeside Park, Kentucky*. An encouraging development in this case is that the Kentucky Supreme Court, in an unrelated case, stated unequivocally that the regulatory power to control radio transmissions had been preempted by Congress, and is beyond the jurisdiction of a state court. This may bode well for the outcome of the *Thernes* case.

3.4) *Goumas, et al. v. City of Cerritos*. Counsel has learned that the U.S. District Court has granted a motion for summary judgment in favor of the City. The plaintiffs may appeal. ARRL is no longer involved in this case.

4) Mr. Sumner presented a written report detailing staff progress toward implementing Board directives arising from the 1984 Annual Meeting. Reports on behalf of Board committees were rendered as follows:

4.1) Mr. Metzger, as Chairman of the Management and Finance Committee, reported on a meeting of the Committee held on April 28 at Dayton, Ohio. Considerable progress was made on the assignments given to the Committee by the Board.

4.2) Mr. Anderson, as a member of the Membership Affairs Committee, reported that the Committee would meet in Atlanta on June 2 to review progress on its assignments.

4.3) Mr. Holladay, as a member of the Plans and Programs Committee, noted that a meeting schedule had not yet been established, and requested that any thoughts with respect to Minute 79 of the 1984 Annual Meeting be communicated to the Committee members.

5) On motion of Mr. Nathanson, the following additional appropriations for committees were granted for the year 1984: Management and Finance Committee: \$6000; Membership Affairs Committee: \$2000; RFI Task Group: \$2000. These amounts supplement the \$6000 annual appropriations for standing committees provided by Standing Order of the Board, and the \$4000 for the RFI Task Group authorized at Minute 121 of the 1984 Annual Meeting.

6) The Committee reviewed a staff report on the subject of simplex autopatches. After discussion, on motion of Mr. Nathanson, the General Manager was instructed, beginning with the August 1984 issue, to require the inclusion of the following disclaimer in QST advertising which discusses the features of simplex autopatch devices: "Use of this device with a transceiver operating in the two-meter band, or on any other frequency below 220.5 MHz, is not permitted unless a separate control link is provided." Work on a Committee report to the Board in response to Minute 73 of the 1984 Annual Meeting is continuing. The Committee was in recess from 5:22 to 5:46 P.M.

7) The Committee next reviewed a staff report on the subject of nets (Minute 99 of the 1984 Annual Board Meeting). During the course of discussion, several revisions were made to the draft. It was agreed that the report, as modified, would form the basis for further work in response to the Board's instruction.

8) A draft memorandum from the General Manager to Board members, requesting input on the subject of the Board committee structure in accordance with Minute 104 of the 1984 Annual Meeting, was reviewed. On motion of Mr. Milius, the General Manager was authorized to circulate the memorandum to Board members on behalf of the Committee.

9) Mr. Sumner presented a progress report on ARRL preparations to become a Volunteer Examiner Coordinator (VEC) in accordance with Minute 52 of the 1984 Annual Meeting of the Board. If FCC rules permitting the reimbursement of VEC expenses are adopted by July 12, there appears to be no reason why the ARRL/FCC agreement cannot be signed immediately thereafter. FCC staff has indicated that the requirement for 30-day advance notification to FCC of examination dates and locations may be waived for good cause; thus, planning is proceeding for ARRL coordination of examinations at hamfests and conventions beginning on Labor Day weekend and continuing through September and October, with coordination of other examination opportunities commencing November 1. A time line prepared by staff, showing the sequence of events which must occur for the program to be on-line on this schedule, was distributed and reviewed.

10) Mr. Price reported on his attendance as an observer at the IARU Region 1 Conference in Cefalu, Sicily, in early April. Mr. Price also requested and received the concurrence of the Committee in assigning to Mr. Nathanson, as IARU Vice President and a member of the IARU Administrative Council, responsibility for presenting to the Administrative Council the ARRL nominations for IARU President and Vice President (Messrs. Baldwin, WIRU, and Smith, W0BWI, respectively) under the terms of the new IARU Constitution. The Administrative Council is to be informed that the ARRL nominees are available for service for a term corresponding to that of ARRL officers, i.e., until the 1986 Annual Meeting of the ARRL Board. Mr. Price also informed the Committee that Mr. Smith had indicated his intention to resign from the IARU Region 2 Executive Committee upon taking office as IARU Vice President. At that time, the Region 2 Executive Committee will request that ARRL designate a replacement. Southeastern Division Director Frank M. Butler, Jr., W4RH, is willing and able to serve; Mr. Smith has requested that the Region 2 Executive Committee invite Mr. Butler to attend its upcoming meeting in Mexico City so that he may become familiar with the Region 2 organization. The Committee was in recess from 7:28 to 10:00 P.M.

11) On motion of Mr. Milius, the Committee recognized the names of 28 newly elected Life Members, and directed the General Manager to list their names in QST.

12) On motion of Mr. Milius, the affiliation of the following Category I clubs was approved:

A1 Malaikah Amateur Radio Shrine Club, Los Angeles, CA

Clifton Amateur Radio Society, Clifton, NJ
Coronado Wireless Association, Edgewater, FL
Pymatung Amateur Radio Club, Hadley, PA
Rimrock Radio Association, Loveland, CO
St. Peters Amateur Radio Club, St. Peters, MO
South Milwaukee ARC, Inc., Oak Creek, WI
South West Iowa ARC, Council Bluffs, IA
Trails End Amateur Radio Club, Ogallala, NE
Washington County ARC, West Bend, WI

With this action, the League has the following number of active affiliated clubs: Category I, 1665; Category II, 11; Category III, 169.

13) On motion of Mr. Grauer, the Committee approved the holding of the following ARRL conventions:

West Virginia State	June 30-July 1, 1984	Weston, WV
South Florida Section	November 24-25, 1984	Clearwater, FL
Nebraska State	March 30-31, 1985	Kearney, NE
Virginia State	September 21-22, 1985	Virginia Beach, VA

14) A letter from Director Diehl transmitting the tentative program for the 1984 ARRL National Convention was discussed. On motion of Mr. Carey, the tentative program was accepted as proposed.

15) It was agreed that the next meeting of the Executive Committee would be scheduled for 9 A.M. Sunday, August 26, in Toronto, Ontario. At this meeting, the qualifications and statements of candidates for Director and Vice Director are to be reviewed. It was noted that the short time between the deadline for nominations, August 20, and the scheduled meeting would necessitate prompt submission of the necessary material by all candidates.

(continued on page 73)

Correspondence

Conducted By Peter R. O'Dell,* KB1N

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

W2NSD AND THE CODE

□ I have just been reading what little has been printed regarding W2NSD's Petition for Rule Making regarding reexamination for code proficiency. While I can't say that I am in favor of such a rule change, it does seem appropriate in light of the response to the FCC's no-code proposal. As the overwhelming opinion of the amateur community seems to indicate that knowledge and proficiency in Morse code is such an important criterion for licensing, it would be only appropriate that we also express ourselves as vocally in favor of this change. I am really sorry that this one didn't come to us as a NPRM before no code. Perhaps then the real attitudes of the amateur community regarding CW skills might have surfaced, instead of the emotional "protectionist" viewpoints I have heard so often among my fellow hams. Perhaps it is time to recall the purpose of the Amateur Radio Service as it is outlined in Section 97.1 of the Rules and notice that Morse proficiency isn't mentioned once. — *Clay Bartholow, KD0BY, Minneapolis, Minnesota*

□ In conjunction with those requirements Green proposes, I would like to suggest that all hams using SSB frequencies be required to take a grammar test every six months. Hams using SSB frequencies would have to use proper English at all times. Any use of words such as "ain't," improper use of pronouns, and using CW abbreviations such as OM, hi, QSB, QSY and QSL would be forbidden. Those individuals whose accent suggests a geographic area would be forbidden to operate SSB frequencies until they had the proper accent deemed acceptable by the FCC. This would allow everyone to sound the same on phone and any individualities would be eliminated. — *John F. Hall, NA7R, Casper, Wyoming*

□ I certainly hope that the FCC, in its wisdom, files Wayne Green's petition in the circular file. — *Dr. Robert J. Ward, K0SRL, Davenport, Iowa*

[*Editor's Note:* The W2NSD petition, mentioned in League Lines for April, was dismissed without action by the FCC on March 9. See League Lines and Happenings in May *QST*.]

ARTIFICIAL AURORA

□ Congrats on the funniest April fool article I've ever seen ("Artificial Radio Aurora," April 1984 *QST*, p. 41). I should write a follow-up on how AMSAT-OSCAR 10's solar cells were supplemented by rectified 2-meter RF during that period. Whatever happened to Mr. Larsen E. Rapp? — *Phil Karn, KA9Q*

Berkeley Heights, New Jersey

□ This is very interesting since it leads me to recall that there was so much activity in the 1939 DX contest that the ionosphere was burned out and became useless — particularly between 14,000 and 14,010 Kc. So you can overdo the "artificial aurora." In fact, I rather doubt that the problem was one of burn out, but rather, an excess of ionization at the D layer.

Regardless, the fact remains that from that time until the mid-1940s Amateur Radio operations ceased except for some limited operation on 5 and 2½ meters. — *David L. Wiesen, K2VX, Newark, New Jersey*

ALL WRAPPED UP

□ I am happy with the new packaging of my *QST*. It will get to me in better condition.

I am happy that there will be no code-free licensing. We do not want to CBize the ham bands.

I am happy for the representation hams get in FCC matters.

I am happy to have the high-type Section Managers we have.

I am happy for the up-to-date information on equipment, manufacturers and dealers of ham gear.

I am happy to know the ARRL will keep me posted on all matters pertaining to ham radio.

I am happy to be a member of the ARRL.

I am happy. — *James D. Henson, Sr., W5BYN, Killeen, Texas*

□ At last! A *QST* shipping wrapper that my mail carrier can't use for a junk-mail-delivery receptacle. *QST* arrived in first class condition! — *Paul Hudson, WA6AVJ, Riverside, California*

□ *QST* in a plastic envelope is great! Thanks! — *Kermit A. Slobb, W9BT, Northbrook, Texas*

□ Your new plastic mailing bag does not appear to be a very good idea . . . In all my years of getting *QST*, I have never received one destroyed to this extent.

I sincerely hope that you will go back to the brown wrapper! — *Robert C. Jones, W5TU, Richardson, Texas*

INCHES ÜBER ALLES!

□ I wish to suggest, very strongly, that all measurements given in *QST* be given in the common system: English. For most of the magazine's history, measurements have been expressed in feet and inches. It seems radical to read measurements in the metric system, let alone converting a 50-foot tape. Pythagoras said: "Man is the measure of all things." Converted from the Greek, of course. If he was right, then why abandon one arbitrary working system for another? — *Daryl E. Duckworth, KD0NF, Loveland, Colorado*

WE DON'T GET NO RESPECT

□ April *QST* did it again! When I first saw the front cover I was shocked — ARRL recommending 700 W on 2 meters in order to "get respect"! This could have serious legal implications — encouraging and abetting of the use of unnecessary power for no better reason than to "get respect." And the implied corollary: What would it take to "get respect" on 80 meters? Then I saw the date — April. Of course, this was only April fool! How clever of the editors to then cover the joke with a straight article on how to really do it, and to further confuse the "April fool" by an obvious joke article on "Artificial Radio Aurora"; and then to set it all straight by the QRP feature on page 52.

I pray that all hams who see the cover read on and understand. — *Henry C. Miller, W3KAG, Hatfield, Pennsylvania*

[*Editor's Note:* There are valid uses for high-power Class AB amplifiers on 2 meters. The serious VHF operator interested in exploring the DX potential at the low end of the band (around 144.200 MHz), using weak-signal modes such as tropo, aurora, meteor scatter and EME, would need an amp such as this to assist him in successful DXing. A high-power amp is necessary to overcome the path loss incurred in long-haul VHF work. Of course, as the cover blurb said, it's not the whole answer to 2-meter WAS, but it would be up to the job if the operator had the other pieces to the puzzle — a good antenna and receiver setup and some operator savvy.]

ALL KEYED UP!

□ I'm still fuming over the sanctimonious and condescending letter from K5CN on the subject of "Keeb breeders" (March *QST*, p. 85). Who is he to set himself up to judge whether communicating with computers that just happen to use the Morse code as a medium is improper or beneath contempt?

I have been enjoying QRQ operation from time to time with other computer owners and find (though this may offend some stuffed shirts) that it is fun! What in the hell is the difference whether I communicate by machine with another amateur at 60 WPM using Baudot, ASCII or Morse?

No one who transmits Baudot at 60 WPM claims to be able to copy it. Darned few can copy Morse at 60 WPM. That's not the issue. If he is offended by someone who calls him with the speed of their Morse keyboard cranked wide open, and he is irritated when they ask for fills, he should sign; but don't criticize someone who is clearly operating within the law and looking for some fun in amateur radio.

Lighten up, fellas! — *Mike Lonneke, W0YR, Des Moines, Iowa*

A SAVAGE RESPONSE

□ Why this "back to you" I keep hearing on the CW end of the ham bands? Whatever happened to the letter "K"? Shouldn't they add "Good Buddy" at the end. — *H. B. Savage, Jr., K4MD, Coconut Creek, Florida*

*Public Information Coordinator, ARRL

**CRRL Officers and Directors**

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO

CRRL, Box 7009, Station E, London, ON N5Y 4J9, Tel. 519-451-3773
CRRL Outgoing QSL Bureau, Box 113, Rothesay, NB E0G 2W0

Honorary Vice President: Noel B. Eaton, VE3CJ

Directors: G. Andrew McLellan, VE1ASJ
Albert G. Daemen, VE2IJ
Raymond W. Perrin, VE3FN
A. George Spencer, VE6AW
William Kremer, VE7CSD

Counsel: B. Robert Benson, Q.C., VE2VW

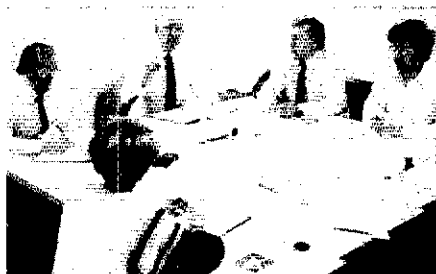
CRRL Members to Choose Board Representatives

Who decides what CRRL, the Canadian Radio Relay League, Inc., will do or not do? You do! As a Full member, your vote determines the direction that CRRL policy will take. This fall, CRRL members will choose Regional Directors to represent their interests on the CRRL Board for two-year terms that begin on January 1, 1985.

The CRRL Board has seven members. Two of these, the CRRL President and Vice President, are elected "at large" in odd-numbered years. The other five, called CRRL Regional Directors, are elected on a geographic basis in even-numbered years. The CRRL Regions are as follows: Western (British Columbia and the Yukon), Prairies (Alberta, Saskatchewan, Manitoba and the Northwest Territories), Ontario, Quebec and Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador).

Under the CRRL By-laws, candidates for CRRL Regional Director must (1) reside in the CRRL Region they wish to serve, (2) have been a member of the League for a continuous term of four years before the date of nomination, (3) have held a Canadian Advanced Amateur Certificate throughout that time, and (4) be at least 21 years of age. Further information can be found in the CRRL By-laws, available on request.

Nominating petitions, to be valid, must carry the names of 10 or more Full members of the League residing in the region concerned. Photocopied signatures are not acceptable. Signatures must be *on the petition*. Petitions sometimes fail because a signer's membership has



run out. It is advisable to have more than the minimum of 10 signatures.

CRRL Quebec Director Al Daemen, VE2IJ, makes a point at a recent meeting with executives of RAQI, Radio Amateur du Québec. The meeting explored ways RAQI and CRRL could work together for Canadian Amateur Radio. As a result of the discussions, you're going to see a bit of French in this column from time to time! Seated around the table (counterclockwise from lower left) are RAQI General Manager Gisele Rouselle, VE2FVO, VE2IJ, RAQI President VE2DKH and VE2ID. (VE3FN photo)

run out. It is advisable to have more than the minimum of 10 signatures.

Petition forms (EDC-1) are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is suggested:

(Place and date)

The Secretary, CRRL

Box 7009, Station E, London, ON N5Y 4J9

We, the undersigned Full members of the Canadian Radio Relay League, Inc., residing in

visible to have more than five signatures on a petition.

Petition forms (CD-129-C) are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is suggested:

(Place and date)

The Secretary, CRRL

Box 7009, Station E, London, ON N5Y 4J9

We, the undersigned Full members of the League residing in the ... Section, hereby nominate ... as Section Manager for this Section for the next two-year term of office.

(Signatures ... Calls ... Addresses including postal codes ...)

A Section Manager candidate must have been a member of the League for a continuous term of at least two years, and be a licensed amateur holding a Canadian Amateur Certificate or higher immediately prior to the receipt of nominating petition at the CRRL Headquarters office.

Petitions must be received at the CRRL Headquarters office on or before 5:30 EDT September 10, 1984.

If only one valid petition is received for a Section, the person nominated will be declared elected without opposition. If more than one valid petition is received for a Section, there will be a balloted election. Ballots will be mailed from the CRRL Headquarters office on or before October 1, 1984. Returns will be counted on November 20, 1984.

Section Managers elected as a result of the above procedures will serve for a two-year term that begins on January 1, 1985.

the ... Region, hereby nominate ... as candidate for Director of this Region for the next two-year term of office.

(Signatures ... Calls ... Addresses including postal codes ...)

Nominations will close at noon EDT August 20, 1984. Eligibility of candidates will be checked shortly after that. If there is only one eligible candidate in a Region, that candidate will be declared elected. If there is more than one eligible candidate in a Region, the CRRL Secretary, on or before October 1, 1984 will send ballots to all those in the Region who were Full CRRL members on September 1, 1984. The ballots will carry a copy of the CRRL By-law that provides for the election and biographical material, statements up to 250 words in length, supplied by the candidates. Marked ballots will be accepted at the CRRL Headquarters office in London, Ontario, until noon EST November 20, 1984, and will be counted shortly after that in the manner prescribed in the CRRL By-laws. Results will be announced on WIAW, through the CRRL News bulletins and in QST.

The next two years will be crucial to the future of Canadian Amateur Radio. The CRRL Board of Directors will have to deal with deregulation of subbands, restructuring the various classes of amateur licence, antenna and tower by-laws, cable television leakage, new services for CRRL members and long-range plans for CRRL. CRRL will need the best possible Board of Directors. You are urged to take the initiative and file a nominating petition now.

Harry MacLean, VE3GRO
(CRRL Secretary)

If no petition is received for a Section by the specified closing date, the Section will be resolicited in January 1985 QST. A Section Manager elected after resolicitation will serve for 18 months.

Vacancies in any Section Manager office between elections will be filled by appointment made by the CRRL Secretary, acting on the advice of the CRRL Board.

You are urged to take the initiative and file a nominating petition immediately.

Harry MacLean, VE3GRO
(CRRL Secretary)

CRRL NEWS

□ At its March 26-27 Meeting, the ARRL Board voted to lower the cost of multiple-year membership in the League. On May 1, CRRL brought its multiple-year membership rates into line with those in the U.S. Single-year memberships are still \$36 a year, but two-year memberships are now \$69 (down from \$71) and three-year memberships are \$96 (down from \$105). Students under 18 and seniors 65 or over received similar reductions. For them, single-year memberships are still \$30 a year, but two-year memberships are now \$57 (down from \$59) and three-year memberships are \$78 (down from \$87). All figures, of course, are in Canadian funds processed through the CRRL Headquarters office in London, Ontario.

□ The CRRL Board will hold its 1984 Annual Meeting at the Airport Holiday Inn, Toronto, Ontario, on Saturday, August 4, 1984.

NO-CODE LICENCE FOR CANADA?

In recent discussions with CRRL, DOC hinted that they would soon be proposing a major restructuring of the various classes of licence available to Canadian amateurs. At press time, word around Ottawa was that this restructuring would provide for the introduction of a new *no-code entry-level amateur licence* for Canada. Such a licence would offer operating privileges on amateur bands 30 MHz and above.

CRRL does not believe that this proposal originated with any amateur organization. It certainly did not originate with CRRL. From all indications that CRRL representatives and workers have had, Canadian amateurs are vigorously opposed to the introduction of this type of licence.

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Quebec and Saskatchewan Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Names of the incumbents are listed on page 8 of QST.

A petition, to be valid, must carry the names of five or more Full members of the League residing in the Section concerned. Photocopied signatures are not acceptable. Signatures must be *on the petition*. It is ad-

How to Enjoy Meaningful DX QSOs

One of the regularly enjoyed periodicals at this QTH is The Totem Tabloid, a monthly produced by the Western Washington DX Club, Inc. The March 1984 issue contains the following eloquent words of wisdom by Bradley Wells, KR7L.

"One of the prime functions of amateur radio, as defined in Part 97 of the FCC rules, is to increase international understanding and goodwill. Listening to many of our DX QSOs, one cannot help but wonder just how much 'understanding' is being promoted by statewide DXers. A typical QSO: FB OM — RIG HR TS130 TO A DIPOLE — WX RAIN ES COOL — PSE QSL VIA BURO — TNX ES 73. Our DX brethren must think we are limited to short monologues and the weather. Listening on the bands, it would seem that many of us are exceeded by very few in our lack of conversational talents.

"There is more to DXing than these 'hello-goodbye' contacts. Lasting friendships are waiting to be discovered and fostered, but only if you are willing to make the effort. Language is not an insurmountable barrier, since English is the first language of radio — lucky for us. Few statewide hams are multilingual. The successful DXer will gradually learn bits and pieces of other languages as they relate to ham conversations.

In addition, there are several conversation guides for hams on the market. If you know another language, don't pass up the opportunity to use it on the air. However, advise the DX station as to the extent of your ability. If you fail to warn him, you may learn the true meaning of humility as the other station comes back with a torrent of rapid-fire Spanish, Polish or Swahili.

"There are other tricks for having meaningful and interesting DX QSOs. Get a good set of world or country maps. I have collected many through my subscription to *National Geographic*. There are many good world atlases available at reasonable prices. Few things will make a DX station feel that you are interested in his or her part of the world more than being able to pinpoint him on a map. The feeling is universal. A DX station once asked me what part of Seattle I lived in. When I said 'west Seattle,' he asked how close did I live to Lincoln Park? He had never been there, but had whipped out a Seattle map at the start of a QSO. We then discussed the finer points of the city and western Washington. Most people like to talk about where they live and why. You can become an expert on some of the most out-of-the-way places in the world.

"Another trick is to ask personal questions.

People like to talk about themselves, their families and their jobs. This trait is not limited to W/Ks. There are few hams who will not fill your ear, given half a chance. However, only do this if you are willing to listen (rather than transmit!). Using this technique, I have learned about forestry in New Zealand, police work in Japan, fireplace inserts in England and the import-export business in Brunei. Again, this Q&A approach works both ways. Usually, the DX station will show the same interest in you that you show him. Politics, sex and religion are perhaps the only areas to be avoided in the interest of good taste and common sense.

"Even longtime DXers persist in the same old trite QSOs. We fall into this trap thinking, perhaps, that the other ham will not understand our English. Fortunately, many DX hams speak English as well as we do — and they can be some of the most interesting people we will ever meet. It is truly unfortunate that we don't take advantage of this opportunity more often. If we can take a real interest in the DX stations we work, surely our perception of the world will expand and change for the better. With a small amount of effort, we can help promote international understanding — and develop many lasting friendships the world over."

PETER I ISLAND

LASVAA makes early note of his intentions to become the first radio amateur to operate from Peter I. Geir wants to get in contact with others of a similar interest to plan for an eventual operation (target time period: the southern summer '85/'86). Interested? Contact Geir Stokkeland, Box 160, N-6390, Vestnes, Norway.

25 YEARS OF THE SPDXC CLUB

Twenty-five years ago, a small group of Polish radio amateurs who were particularly interested in working DX presented a draft set of rules to the Polish Amateur Radio Society, the PZK — an outline for a new club that today we know as the SPDXC. Thus, on June 9, 1959, we saw the founding principles set forth for an active DX organization within the framework of the national society. The principles set forth were similar to those for the ARRL DXCC Award. To date, over 300 Polish amateurs have qualified as regular club members.

During this period, the SPDXC has animated the sport of Polish DXing and has led to high achievements for SP DXers on an international level. Ten club members have over 300 countries confirmed; over 100 members hold between 200 and 300 country confirmations; and almost all the club members do indeed hold the DXCC Award. In addition, there are holders of the 5BDXCC in the club, and a number of members have fulfilled the requirements for appearance on the DXCC Honor Roll.

September 1984 will be the occasion for a special meeting of all SPDXC members, at which time honorary members will be welcome. More on this as information is received. *Special congratulations to the SPDXC on its silver anniversary!*

HH2VP

June 15, 1979-April 11, 1984: 110,000 QSOs, 5BDXCC, 5BWAS, 5BWAZ and one heck of a lot of fun. Even after nearly five years, there was still a pileup. How many hams can there be out there? I tried to work them all. I returned home to Rhode Island in mid-April and am retiring from active work. That

dream house for retirement may mean Connecticut for summer, and SC or west-coast Florida for winter. However, I will be going back to Haiti for short trips (2-3 weeks or so) every 3 or 4 months for the following year. — *N4XR/HH2VP (ex-W1EOB)*

LISTENING FOR THE LACCADIVES

"I live in a rather poor DX location. As you approach south and around the rest of the way, the local hills rise, reaching a subtended angle of about 40 degrees toward ZL and UK. For the long path toward the Indian Ocean, the slope rises to 20 degrees, not exactly ideal for a 14,500-mile RF journey.

"I listened for the Laccadives dutifully for five nights. The throng calling between 14.250 and .260 was deafening. There was a very weak signal in the noise at about 14.195. If I called and he replied, I would not even be able to tell — I didn't bother to warm up the heaters.

"On the sixth evening, the penultimate day of the operation, the VU7 signal was just barely readable. He changed his *modus operandi* and was listening 5 up and 5 down. What ploy to fool the unwary was this? The stations he was working were giving 5-7 to plus 20



Never give up! Almost 25 years after working FQ8AF, W1DGJ received country confirmation no. 346 from Gus, who is no longer an active amateur. Mike thanks everyone who helped him get another "new one" confirmed for his DXCC.



JH1WIX's station as J2GX in 1933 (left) running 500 W to a 204A, and the legendary Taroh Yagi today, continuing to thrill Novices with their first DX contact.



*19620 6W 234 St., Homestead, FL 33031

reports. I called several times without luck. It looked hopeless.

"Those of you who have witnessed the San Francisco area fog billow inexorably over the hills can appreciate my feelings that the shroud of darkness was rolling westward, burying the DX hopefuls to the East. First the Midwest fell silent, then Texas, Phoenix and the Southwest. Finally, even Los Angeles and Southern California were gone. He was only contacting the far western reaches of the San Francisco area and northward. The ranks had thinned. His signal had faded a bit, but he was still readable. I had a chance!

"I feverishly switched between VFOs trying to find where he was listening. It was easier now, and I found him. I confirmed both sides of the QSO, zero beat the frequency and waited. I called. No luck. He wasn't listening on this frequency anymore. I'd better find out where he moved to. As I reached for the remote VFO, a voice reminiscent of that from Triskelion sent, 'hold —' reverberating through my brain. My fingers froze an inch or so from the knob. Maybe he is listening 5 up and 5 down. Maybe he has two receiving VFOs! Maybe he is alternating between them. Maybe he'll be right back to this frequency. I sat back and adjusted my boom mike. My toes, which were curled around the foot switch, were programmed to contract on the zero in QRZ. I waited. My toes flexed. I called. Toes released. An eternity elapsed during the milliseconds until the clipped-British-accented voice spoke above the noise: 'The Whiskysix, Bravo, question mark, November only, call again, please.' I got him! I called, repeating and enunciating the 'Delta.' His signals were now 4 x 3 (inflated a bit) near San Francisco. He replied, 'W6BDN, I QSL 4 x 3 from San Francisco; you're 5 and 1 from VU7WCY/GDG; QSL?' Boy, do I QSL!

"I relaxed and listened. He worked a few more northern coastal 6s and 7s. Within 10 minutes there was only silence." (A true story by Marty, W6BDN)

THE CIRCUIT

□ HL: WB4YXA/DA2MR should be about ready to activate the bands after his move following a two-year stay in Germany. QSL Tom via Box 404, HHC, 3rd Infantry Division, APO San Francisco 09036.



TG9EW/Y99EW, taken at K4UO's Clearwater, Florida, QTH. Terry is currently promoting top-band activity in Central and South America. (tnx K4UO)

□ Clubs: Madison (Wisconsin) DX Club — Pres. KC9LM, V.P. N9CPW, Sec'y. N9BAF; info from N9BAF, Carolina DX Assn. — Pres. WA4VCC, V.P. N4ZC, Sec'y. KD4RH. SE DX Club (Atlanta) — Pres. WB4ZNH, V.P. KC4BX, Sec'y. WA4HNL.

□ ADXA: The Arkansas DX Association has decided to hold its annual DX meeting and banquet Saturday, October 6, 1984, at the Majestic Hotel in Hot Springs. This is a departure from their normal tradition of holding this fun affair during the "chancy weather"

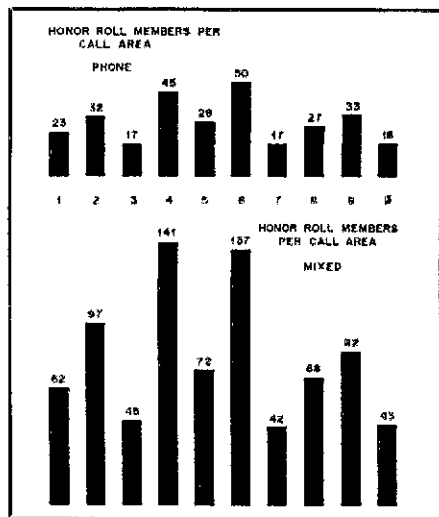
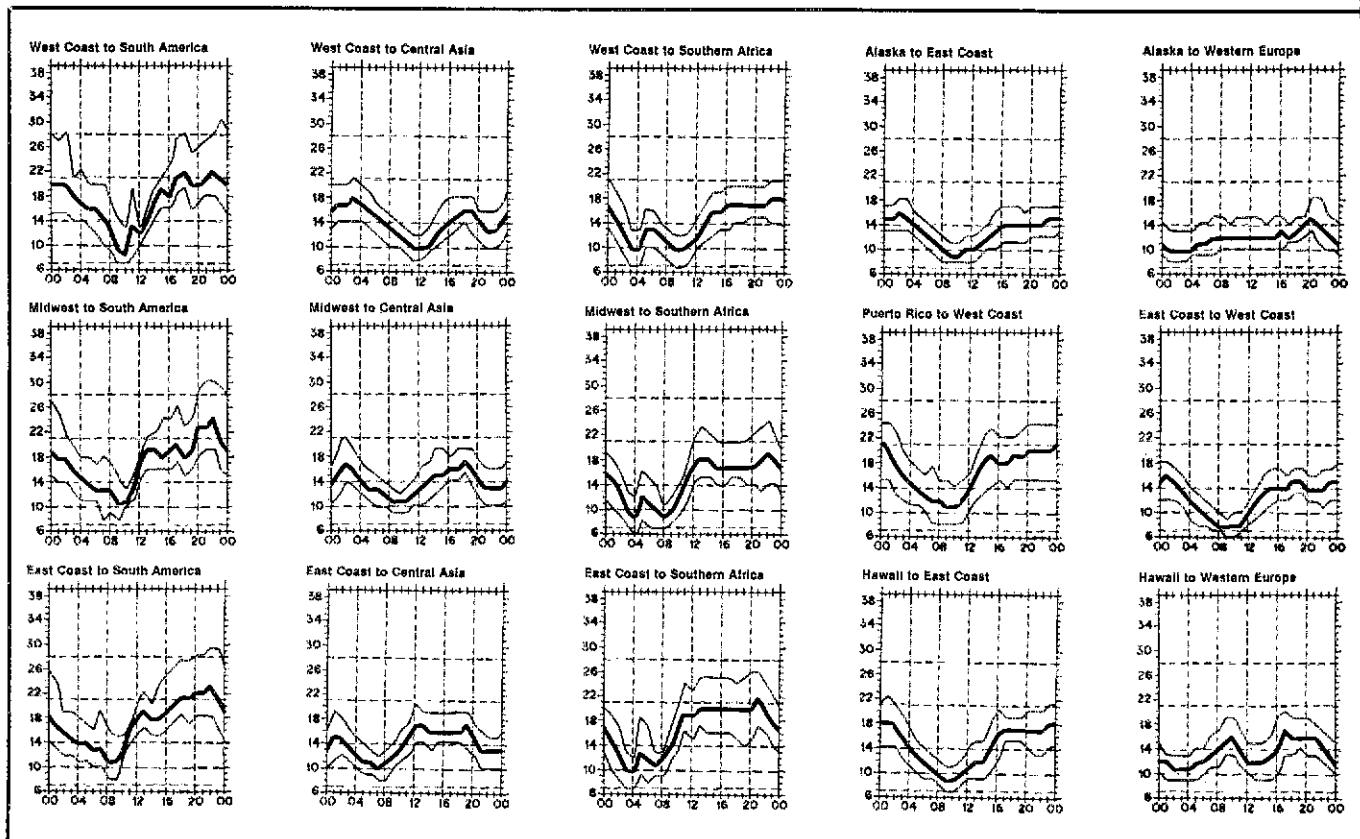


Fig. 1 — K8LJG's graph compiled from the March 1984 Honor Roll listings comparing numbers of HR members per call area both mixed and phone DXCC.

period of early December. Requests for banquet information or reservations go to Earl Smith, KD5ZM, Rte. 10, 7 Meadow Cove, Pine Bluff, AR 71602. The club's DX information net on 3.815 MHz (0200Z Mon.) has continued to stimulate club interest. 1984 officers are Pres. W5LQN, V.P. W5ACE and Sec'y./Treas. KD5ZM.

□ Tahiti: 15-years-young KA6LAF's first DXpedition as FO8KI will take place this month. Jeff has 252 worked, 103 confirmed. This trip will feature CW. QSL



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

via Jeff Kinzli, 400 N. Parkway, Santa Cruz, CA 95062.

□ Bouvet: There may or may not be experienced radio amateurs on the crew of this Norwegian scientific expedition due to start from South America before year end. Bouvet will be last stop after approximately two months enroute, late in the season. A landing of short duration (1-3 days) may be expected, but operation *cannot* be guaranteed. Other alternatives are being explored by the 3Y Project set up by the LA DX Group in 1983, with LA5UF as Project Mgr. (with an assist by LA1EE). If suitable means of transportation are found, it may be possible to organize a Bouvet event in January/February 1985. The group would like to get in touch with persons/organizations/companies that can contribute to a transportation solution — as well as an assessment of what contributions might be counted on. Write the 3Y Project, c/o Jorgen Hoel, Munkerudasen 12E, 1165 Oslo 11, Norway.

□ Goa: W6PHF is still on the track of information regarding Joao, CR8AZ, who stated that he was in Pangim, Goa, in September 1958, and requested that cards be sent via CR8AC.

□ K8PYD/VS6-IH9YD: Both operations by Leo, K8PYD. Watch for photos in an upcoming issue.

□ Bermuda: Special congratulations are in order to all the VP9 contingent, celebrating the 375th anniversary of their island this year.

□ SU1ER: Boyd, W4ZWE, furnishes interesting tidbits re Ezzat (and his daughter Maggi, SU1MR). Boyd has convinced Ezzat of the joys of 75-meter phone, and notes that the best time to catch Ezzat is on Fridays, around 0300-0400Z (Thursday night, stateside). Boyd will be happy to assist with skeds, as well as cards for SU1ER/MR, only for this period and after he rotates home. Ezzat and Maggi use a KWM-2, 922 linear, 80/75 dipole, 204BA and an all-band vertical. Only Egyptians may be licensed and operate. Favorite frequencies are 3780, 7080, 14,280, 21,280, 28,580. Not much operation, as yet, on 40. Boyd will be in Egypt until January 1985. Further information via Boyd Shelton, W4ZWE, 2143 Grimwood Rd., Toney, AL 35773.

□ YS9HH: N0DWU/4 operated there 1982-1983 and needs only four cards to complete his 3BWAS. He has

been unable to contact WA7UHW, WA7UEC, KA1TW and W7LTB. For various reasons he cannot return to El Salvador, and would really like those cards. Info goes to H. C. Hutchison, 1557-B McArthur, Fayetteville, NC 28301.

□ DU5Q: W9GSB notes that word from W6HHG indicates the probability that DU5Q was as phony as a three-dollar bill, taking in several dozen of the faithful. On a lighter note, Lou notes that the QSL route for SV0BBM/BN (Crete) is WB9UJJ.

H44SH (ADIS)
LA7WI/XE2 (KA7KA1)
OA4BID (K5MK)
OX5RJ (WA1FSV)
P42J (W1KDD)
TR8DR (W2PD)
VP2KBU (KC0FW)
VP8KF (G3VPW)
XE2RB (KDSGY)
ZF2GW (W2HPF)
ZL7PO Direct, Lester Price, P.O. Radio Station
Waitangi, Chatham Islands
ZM7VU (F6DYG)
ZL0AEA (K9AKS)
3D2DX (VE6RA)
5B4LP (KA3FIB)
5B4MF P.O. Box 9129, Nicosia, Cyprus
5N3RTF (DK2IF)
6W1AR (WB4LFM)
6Y5BW (KC3EK)
8P6RE (KC3EK)
8Q7BX (I4ALU)
9U5JB (ON5NT)

QSL Corner

Administered By Joan Hushin, KA1F0

Here is some information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

AM7CFW (EA7CFW)
CN8EL (W2PD)
FK2CE (K2ROR)
FO8BI P.O. 5924, Papete
FO8JP (F1BBD)
G4GED (T30AT)
HC1OT (W2KF)
HH2CQ (WD4IKJ)
HH2VP (W1FJ)
HI8LC (W2KF)
HK1AMW (KC3EK)
H44R Direct, Box 258, Honiara, Solomon Is.
H44SA (ADIS)

QSL Manager Volunteers

W9OEB
KB7VY

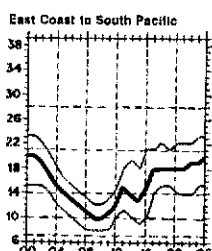
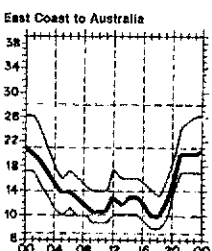
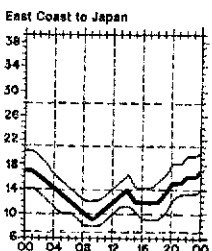
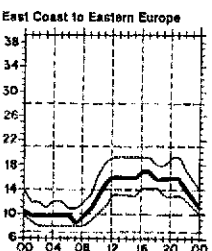
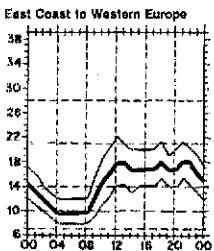
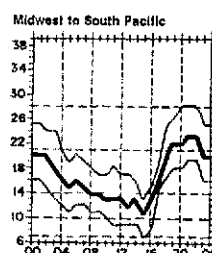
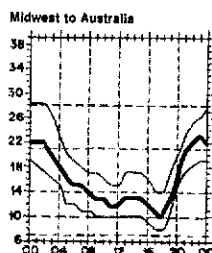
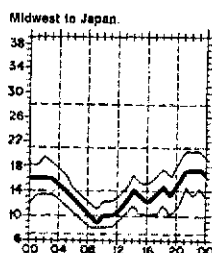
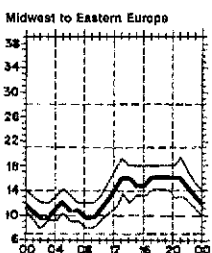
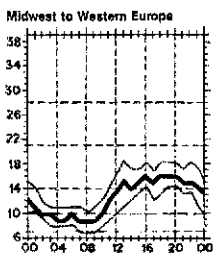
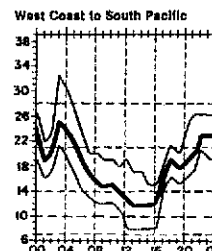
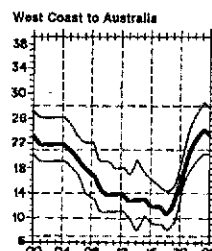
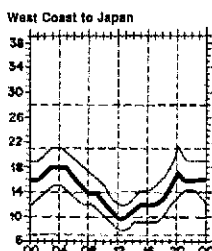
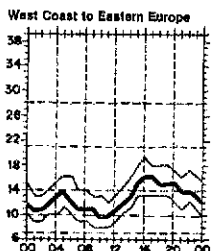
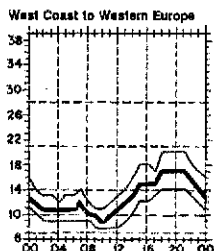
Not QSL Managers

VE3FET is not manager for 3D2HE.
KC3EK is not manager for 6Y5SG.

Special Notes

□ The Sierra Leone Amateur Radio Society regrets the delay in acknowledgments of the 9L—WCY cards. All contacts will be acknowledged as soon as the cards are available.

□ March 1984 QSL Corner, page 65, contains information on the operations of the ARRL Outgoing Overseas QSL Service. June 1984 QSL Corner contains information and addresses for the Incoming Bureaus. For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.



lowest curve (optimum traffic frequency, or *fof*). See April 1983 *QST*, page 63, January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for July 15 to August 15, 1984 assume a sunspot number of 52, which corresponds to a 2800-MHz solar flux of 104.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 1984. An s.a.s.e will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DL4BBH/138 DL4JV/105 DL6EK/136 DL7WJ/104 HB9APJ/153 HB9AQN/101 HB9BIN/105	H18JTB/104 I3VRV/321 JA1BFF/231 JA1KYE/257 JA1QLR/120 JA1QZC/183 JA1SIM/114	JG1HUQ/144 JH1VNW/105 JN2JW/108 JA3IYS/110 JE8BYA/109 JA7DOT/171 JA7HKQ/119	JA7MGP/110 JP4EEH/181 KP4KH/111 ON4ALC/109 OZ1FVL/163 PY2ZH/230 SM5AHX/108	VE2DWH/139 VE7AHA/309 Z4XW/129 9K2BE/140 K1NFE/104 K1QPM/103 KA1HFN/104	KM1G/104 KT2Q/102 N2RB/169 NB2T/125 NB2Z/152 ND2K/151	AJ3K/105 KA3GWD/120 WB3BH/101 N4FLQ/102 W4PCO/101 K5CON/287	KD5UQ/110 KV5I/109 WD5HRW/102 N6LJX/100 NB6G/156 AK7Y/164	N8EKS/100 WA8MLV/100 WA8TSM/100 WD8RTRW/132 W8YDP/107 K0ZB/101
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Radiotelephone

C5AGC/111 DJ8CP/114 DK1ZN/198 DL3NAC/102 DL8MAD/109 EA4GT/160	F6CYV/130 HC1OT/110 HG5TL/104 H18JTB/101 I2BCU/165 JA1BFF/116	JA1KYE/255 JH2JW/108 JF6BYA/109 JA7DOT/143 JA7MGP/110 JA9EEH/161	KP4HC/101 L21BY/200 OK2QR/207 SV8RX/155 TQ9HH/104 XE1SWS/109	YC3BRY/110 YC3CGF/101 YC2KQ/103 6WICK/127 9K2BE/133 K1NFE/104	KE1E/141 KM1G/102 KA2MBC/158 N2RB/151 NB2Z/146 KA3GWD/111	KB3WF/101 W3JV/108 AA4AM/101 N4HBD/133 W4AYQ/104 WT4I/107	K5KNA/141 KE5KK/104 W5TZN/159 EA6Y/238 K6JTJ/107 N6HVZ/105	WB6FZN/173 W7IM/127 KDBK/109 KD9EB/126 K09J/102 K06SV/101
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CW

DL3EAM/107 DL7WJ/104 EA3EEE/109 HK1MY/103	HK0BKX/100 IK1CJT/104 JA1BFF/171 JA1QLR/108	JA1QZC/121 JA7DOT/130 JA7HKQ/118 LA1CCA/107	PA3BFH/110 PY2CAR/200 UW3DR/245 VE3MFZ/124	VE7AHA/234 XE1MD/136 AK1E/100 K1G/100	W1BET/133 AG2C/104 N3BQS/103 W3EBK/100	WB3HDP/104 NB6G/107 WB8H/111 AK7Y/111	N7DM/100 NA7Y/108 W7BI/102	W7ILE/102 WA8MLV/101 K0HQW/100
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RTTY

WD5ELJ WB2VTD

160 Meters

K2UU K4DY K5UR AD8I OK2PGU

5B DXCC

K5BZU K3ND WB2CEI	N8BM WB6FDQ W3FM	N5UA Y8BWR N5AWS	KB1H HB9BVQ KV2S	K2QF KZ2I DK9MC	W0JLC JA2AIR UB5UAL	UB5BAT JA1DM W9TY	N4BAE PY5EG	K2HVN N3AM
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Endorsements

Mixed

CE6EAT/300 GX6CW/320 DJ6KH/310 DJ9UM/250 DK3CQ/250 DL6MBY/205 DL7FAH/257 EA3NA/320 EA4CU/178 EA8HJ/147 F2GL/315 F9XJ/270 G3CCQ/255 HB9GDS/127 I2RFJ/282 I9TQH/273 J88AQ/228 JA1AF/231 JA1CJF/222 JA1WTI/311 JA2DC/251 JA2DN/266 JA3ANW/290 JA3EMU/323 JA7BDS/286 JR7OOO/221	J88IXM/318 JA8MKZ/299 JA9CXA/322 OK2QR/303 OZ3IY/234 PY5ATL/328 SM5LI/194 SM6AHS/287 SM6AVN/231 SM6CMU/320 SM6CWK/336 UW3DR/304 VE1BWP/230 VE2PT/153 VE3GCQ/332 VE3GM/333 VE3GVL/251 VE3MZF/209 VE4MT/126 VE7DX/305 VE7IG/335 VE7SY/339 VE7SV/182 XE1MMD/182 XE1VIC/211 XE1VV/276	YU1AM/328 ZS2DQ/216 ZS6ASW/202 ZS6AZC/178 7Y5HN/199 AD1C/281 K1AR/301 K1CC/321 K1DII/202 K1PV/153 KE1E/148 N1BHC/231 N1ACB/300 W1AGT/303 W1BET/104 W1IHS/199 W1IKB/311 W1SG/254 W1VH/305 W1WAJ/280 WB1FCP/152 K2HVN/319 K2IAB/167 K2KJQ/152 K2PLF/299 N3US/313 KA2GMT/249	KA2MBC/177 K2CCQ/252 N2AWM/207 N2JL/300 N2WS/277 W2AZX/342 W2BTG/274 W2JWK/255 W2MIQ/319 W2NC/341 W2A2FS/291 WB2BNH/147 WB2VO/223 AE3S/299 K3JPG/331 K3JL/355 K3JGU/271 K3NN/320 K3RT/306 K3TUP/328 K3JGX/179 KB3OM/262 KB3XU/302 K3JL/292 N4X/250 W4QJ/304 W4RA/295	W3FM/315 W3GG/331 K1L/290 W3GOH/310 W3KU/287 W3LMZ/315 W3TB/177 W3UJ/308 WB3JNX/250 K4GJ/318 K4ISW/334 K4PT/251 WB2VQ/275 KA4HWG/181 KB4LX/249 KC4HN/175 N4GF/224 N4HB/138 N4HH/311 N4SU/360 NE4A/302 NO4N/208 NT4W/260 NY4X/250 W4QJ/304 W4RA/295	W4VOS/129 W4YK/216 WA4JW/300 WB4QN/321 WC4B/158 A15B/307 K3KNA/282 K7LP/315 K5RC/337 K5TA/291 K5TSC/300 KB5AS/295 NE5C/301 W5CWQ/302 W5HFN/176 W5JE/275 W5MCH/157 W5QN/304 W5WDB/151 W5BTON/126 W5P/257 K6AG/315 K6ANP/305 K6SVL/326 KA6DX/228 KM6N/271	N6ADI/286 N6GM/344 N6NO/231 NW6S/286 W6CRE/308 W6DH/271 W6DUJ/318 W6GYM/260 W3MEL/273 W6PKB/207 W6XS/221 W6YQ/300 WD6DKG/275 K7CE/225 K7RLS/318 ND7B/183 NB7P/260 W7DQM/321 K9NJ/151 K9J/251 K9Y/175 K9VH/185 K9VJ/175 K9SB/202 WB9K/321 W9DH/336	K8MW/206 K8NN/319 KC8AU/208 KC8YV/208 KX8N/175 N8BM/310 W8DOH/337 W8LT/181 WA8PYL/320 K9AJ/320 WA9MAG/320 K9GX/306 K9HQM/311 K9K/275 K9ZO/307 KB9EZ/321 KC9AT/261 KC9XF/200 K09J/151 K0J/251 K0Y/175 K0VH/185 K0VJ/175 K0SB/202 WB9K/321 W9DH/336	W9GSB/271 W9HAH/229 W9IT/301 W9KE/172 W9PVM/225 W9SS/325 W9YT/301 WA9EA/150 WA9EKA/300 WB9PF/167 WA9MAG/292 WA9TAH/272 WB9UO/199 WD9AJ/305 W09KJZ/207 AB0X/311 A100/271 K0CVD/281 K09J/151 K0J/251 K0Y/175 K0VH/185 K0VJ/175 K0SB/202 WB9K/321 W9DH/336
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Radiotelephone

CE6EAT/287 DJ9UM/290 EA3OD/301 EA4CU/178 EA4JL/334 EA4QR/177 F6FWW/260 G3CCQ/221 G3WOF/291 HB9RG/284 HC1HC/263 HC1HW/237 I1HAG/311 I1XA/279 I3VRV/322 I4ZSQ/334 I9TQH/264	J88AQ/223 JA1WTI/295 JA2KL/320 JR7COO/193 JA8IXM/314 JA8MKZ/279 JH8GWW/269 JA9CXA/282 LU2DX/319 LU3MCJ/199 OZ21ACB/155 OZ2AT/181 PY2IY/300 PY3CK/175 PY7KW/249 PT7WZ/252 SM3BSF/226	SM5LI/186 SM6AHS/285 SM6AVN/231 VE1SWS/202 VE1OC/186 VE2DRN/150 VE3BX/324 VE3GCQ/331 WA1PEL/270 VE3NPJ/202 VE4BJ/311 VK9NS/286 XE1MD/255 XE1MMD/178 XE1VIC/211 XE1VJ/272 YS1UL/175	YV1EAH/286 8P6OV/203 KA1YM/152 N1AIS/153 W1FZ/352 W1GKK/350 W1NBE/147 WA1PEL/270 K2IAB/161 K2PLF/277 KB2L/150 K2CCQ/249 K2FC/255 K2CKU/251 K2CQ/248 K2ZW/154 N2DNY/126	W2MIG/317 WA2FB/286 WB2TKU/201 K3BY/226 K3LUE/271 K3RT/273 KB3GX/178 KJ3L/267 N3BQS/131 N3US/305 W3DYT/169 W3GG/327 K05Z/151 WB3CIV/300 K4GDE/204 K4GJ/318 K4DJ/201	KA4GYU/178 KC4HN/126 NT4W/260 W4BLB/224 W4MCP/336 W4MOP/250 W4RA/290 WA4RXC/189 WO4L/204 K5CON/286 K5TSQ/277 W5G/304 K05Z/151 K05BM/232 N5C/301 WB6KQ/226 K7CE/225	W5AYZ/305 W5EFA/302 W5VNB/137 W5SDV/276 K6SVL/326 KB6HW/148 N6ADI/273 NW6S/268 N6BAK/270 W8CHE/302 W8DH/260 W8GYM/260 W8KOE/332 W8MEL/213 WB6KQ/226 K7CE/225	K7LYT/151 KX7J/194 NB7R/252 ND7B/172 W7DQM/320 W7GSP/205 W7MCG/207 K8NN/316 KC8AU/197 WA8PYL/311 W8DIZ/200 K9G/304 K9HQM/308 KB9K/270 K59H/126 W9HJ/314	W9NIO/280 W9SS/325 WA9EA/148 WA9IVU/259 WA9OVU/205 WA9TAH/266 WB9UO/199 WD9AJ/303 W09KJZ/176 K0CVD/270 K09J/151 K0J/251 K0Y/175 K0VH/185 K0VJ/175 K0SB/202 WB9K/321 W9DH/336
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CW

DL1HH/290 EA3BEN/187 F9XJ/223 G4JW/129 I8JOV/185 JA1BK/289	JA2DC/212 JH7BDS/288 SM6CMU/273 VE3LWV/175 VE7AAQ/273 VK9NL/171	VK9NS/212 AD1C/287 K1PV/150 AA2F/158 K2PLF/229 W2MIG/301	W2NC/301 KA3R/270 N3AKD/172 KA4JMZ/175 KZ4V/151 W4CZU/250	W4ZR/225 W4CB/125 K5TSQ/270 W5MUG/145 K5CBL/301 N6ADI/175	NW6S/219 W6BS/287 W6DRU/131 W6DU/251 W6YQ/284 KA7BDA/175	KN7B/125 W7EKM/252 AC8V/233 K8DD/189 K8MW/187 K9BLY/175	K9GX/251 K9ZQ/280 KA9FYZ/124 W9IT/234 WA9EKA/285 WA9TAH/135	WD9AHJ/300 A100/256 K0GUG/252 K0CJF/271 K09G/205 K59H/126
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DXCC Notes

RTTY Endorsable

Endorsements for RTTY DXCC shall be available beginning 1 August 1984 for contacts made on or after 15 November 1945. The same provisions as applied to the mixed, phone and CW award will prevail, with the exception that there will be no Honor Roll. This is to comply with Minute 34 of the March 1984 Board Meeting. Since RTTY was not endorsable in the past, a complete record of the original 100 credits submitted for the award was not kept. To apply for endorsement, the 100 previously submitted confirmations plus 25 additional confirmations (Rule 5), must be sent. Original RTTY certificate numbers will be retained. Those holding RTTY DXCC, applying for endorsement and new initial applicants must submit forms CD 184 and CD 253. Forms are available from ARRL Hq. for a business-size s.a.s.e., with two units of first-class postage.

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

It Is We Who Must Do It — Save 220!

All of our bands are continuously under scrutiny by commercial interests and government agencies seeking space in the spectrum. One, for which we seem to face almost continuous threats — from sharing or outright reassignment — is the 1¼-meter band, or 220 to 225 MHz. Over the years, we have seen various proposals come and go to give this region of the spectrum to everything from CB to river boats. So far, we have managed to stave off these onslaughts, but they keep coming.

Some in the Land Mobile Service apparently feel that, now that the no-code license has been killed, we have lost our last chance to provide substantial amateur population in the 220-MHz band, and thus it is ripe for the plucking. Our job is to prove this contention false. The fact is, even without no-code, the amateur population in the United States is increasing steadily. With the coming of the volunteer-examination program, and clubs establishing additional training classes as well as preparing to administer the exams, the number of licensed amateurs in the U.S. should climb faster than it has in many years. Many new hams show up first on VHF, mostly 2-meter FM, soon after receiving their tickets. In addition, many old-timers are already there.

As a result, that facet of our hobby is becoming very crowded, particularly near the larger cities. In many of the more populated areas, no new 2-meter repeater pairs are available and we are beginning to hear of the FCC taking action against unsanctioned machines. The 420- to 450-MHz band is also quite crowded in many areas. Since it is the lowest frequency on which ATV is permitted, significant pressure is placed on other modes using the band. In addition, 3 MHz of the band is dedicated to satellite use by WARC allocation. Taken together, these fac-

tors make it difficult for this band to accommodate much of the overflow from 2 meters.

The logical place for expanded activity of all types is the 1¼-meter band. The 5 MHz we have in this region of the spectrum provides ample room for various modes from weak-signal tropo, meteor scatter, and EME to FM simplex and repeater operation, as well as the newest amateur mode, packet radio.

No matter what our particular interests, we can form a concerted effort to show that Amateur Radio does use the 1¼-meter band. Remember: Activity breeds activity, and chances are that our use of 220 to 225 MHz will be instrumental in convincing newcomers and others that this is the band for them, too. In addition to merely being active, we must publicize our results in *QST* and other Amateur Radio publications, as well as seek coverage in nonamateur media. Those whose interest is in weak-signal DX, and have worked more than just a few states, should send their totals to me for inclusion in the 1¼-Meter Standings, which appears in this column twice each year. I have a handy form for preparing this list, and will be glad to forward a few to anyone sending me an s.a.s.e. marked "1¼-M Standings Forms." Also, be sure to submit details of particularly interesting DX contacts made, whether via the moon, the troposphere or aurora. This column will continue to provide space for 1¼-meter information, but I must get it before I can print it. Those with equipment designs well-suited to 220 MHz should write them up and send them on to their favorite amateur publication. This goes especially for ideas for modifying equipment originally intended for other bands or services.

Much progress has been made over the past year in increasing the use of our 220-MHz band. In the EME area, there have been numerous

DXpeditions to put rare states on and, as a result, six 1¼-meter WAS Awards have now been issued. Significant increases in terrestrial activity have been noted. The Tuesday evening activity night turnout continues at a good pace in many parts of the country and, on the FM side, the number of repeaters operating in the U.S. has increased 40 percent, to 941, since 1983. That's a good start, but there is much more to be done to show that Amateur Radio needs and is using this band.

A publication devoted exclusively to promoting 1¼ meters, called *220 Notes*, is put out by Art Reis, K9XI, 308 Eastgate Ct., New Lenox, IL 60451. After doing a fine job of researching the current status and future prospects of the band, Art produced a bulletin summarizing his findings. In it he makes the very valid point that we haven't lost 220 yet, and threats that may be in the offing are at least a year or more away. He found that there are influential people in Washington who appear to be on our side, and he feels that evidence of our utilization of the band should stand us in good stead. Art urges that our action right now should not be to put pressure on FCC, but rather to build activity on 220. If, in the next year or so, a Notice of Proposed Rule Making proposing a change in our status is issued, then (not now when there is no active proposal before the Commission) will be the time for filing comments. Our actions in the meantime will have a lot to do with strengthening our arguments, should commenting prove necessary. About 2000 copies of K9XI's bulletin were distributed at the Dayton Hamvention; however, a few copies remain. While the supply lasts, anyone wishing one may send an s.a.s.e. to me at the address listed at the bottom of this page.

There is still time to save 220, and it's up to us to do it!

CENTRAL STATES VHF CONFERENCE IN CEDAR RAPIDS

One of the major events of the VHF year, the annual conference sponsored by the Central States VHF Society, is set to convene in just a few weeks. This year's event is scheduled for July 27-29 at the Sheraton Inn near the Cedar Rapids, Iowa, airport. A few new wrinkles have been added for 1984. Many of the talks are to be held to one-half hour or less, with a few of the more weighty subjects getting the more customary one hour. Also, a printed synopsis of the presentations is to be published, for which a nominal fee will be charged. The antenna-gain session will be held Friday afternoon rather than on the usual Saturday. It is hoped that this change will be of benefit to those coming mainly for the talks.

The Central States VHF Conference is always a bang-up affair, and is almost a must for any serious VHFers who can make it. These Conferences have always had a good reputation for providing activities for nonhams, so don't be afraid to bring family members along. There should be plenty to occupy them while you are doing your "thing" at the talks, antenna-gain competition and other events. For further details, contact Ed Fitch, W0OHU, 1628 Northern Heights Dr., Rochester, MN 55904.

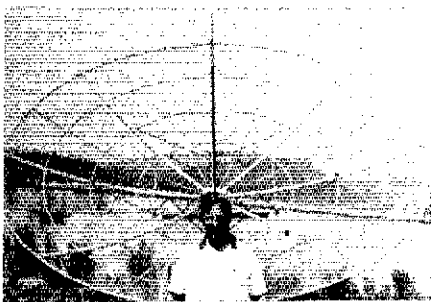
CU in Cedar Rapids!

AROUND THE WORLD

□ The long struggle appears to be over. SMSAGM, one of the originators of the system, reports that the

Maidenhead Locator System was approved at the IARU Region 1 meeting held at Cefalu, Sicily, April 8-13. (See separate article on that meeting elsewhere in this issue.) VHFers in Europe and Africa are asked to begin using the new system starting January 1, 1985. This is the same system we have been using since the beginning of last year; it is the basis for the VUCC Award and is now used in some of the League-sponsored VHF contests. It is already being used on a worldwide basis in the AMSAT-Stoner Challenge Cup competition being conducted on the OSCAR 10 satellite (see April *QST*, p. 57). The 2-meter section carries news of one European who has already been treating it as a worldwide system.

The Sicily meeting was attended by representatives



PY2BJO proudly shows off his fine-looking dish. Junior is providing Brazil to many 70-cm moonbouncers.

from 33 Region 1 countries in both Europe and Africa, as well as observers from Regions 2 and 3. IARU President WIRU and League President W4RA were also present. Other matters of interest to VHFers agreed to included clearing the 144.8-145 MHz Region 1 beacon band and the 145.8-146 MHz satellite band of FM repeaters, and a resolution urging the removal of the Syledis radar from 430 MHz. In addition, the member-societies were asked to approach their national administrations for an amateur allocation at 50 MHz. Provisional approval was given for a new 23-cm band plan.

□ A VHF gathering with an attendance of over 2500? That was the registration of the RSGB VHF Conference held March 24. I wonder when this part of the world can produce such a turnout.

ON THE BANDS

6 Meters — Mid-May, when this column is being put to bed, is too early to assess the 1984 Sporadic E season, but the openings to date seem to be more numerous than usual for this time of year. As an added attraction, scattered South American openings continued up to the time this is being written. K1TOL reports LUs into his QTH in Bangor, Maine, the afternoon of May 12. The opening was shared by KA1FE, VE1YX and WA1OUB. The latter reports working LUs 3EX and 4VBV about 2145Z and VP9GE about 45 minutes later. The previous day, N7DB near Portland, Oregon, notes working LU9AEA at about 2200Z. Dave was hearing WSFF at the time, so E, almost certainly played a part in the propagation.

The afternoon of April 30 brought a number of LUs into the Washington, DC area with very good strengths, according to W4CKD. W3WFM north of Baltimore says that the 24th was another good day here in the Mid

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

Noise Temperature, Antenna Temperature and Sun Noise

Despite the fact that we can amplify a weak signal by virtually any desired amount, it is impossible to detect an arbitrarily weak signal because of the presence of random electrical fluctuations known as noise. This noise can be generated in the receiver itself or external to the receiver by such sources as the sun, the galaxy or the earth itself. One scale used to measure this noise is noise temperature.

In a device such as a resistor, electrons move in a random manner because of thermal agitation. This random motion generates electrical noise, known as thermal noise (or Johnson noise). This noise increases with increasing temperature. It can be shown that the total noise power generated in a given bandwidth is given by the relationship

$$p = k T B \quad (\text{Eq. 1})$$

where

- p = noise power (watts)
- k = Boltzmann's constant (1.374×10^{-23} joule/K)
- B = the bandwidth (hertz)
- T = the absolute temperature (K)

In this case, T would be the noise temperature of the resistor, and also its physical temperature. In other cases — for example, a GaAsFET amplifier — the device's noise and physical temperature need not be the same. If the device generates a certain amount of noise power, p, in a bandwidth, B, its noise temperature, T, is given by

$$T = p/(kB) \quad (\text{Eq. 2})$$

Noise temperature bears a fixed relationship to noise figure, since they both are a measure of the noise generated by a device. (See Fig. 1.) The relationship is

$$T = 290 [10^{NF/10} - 1] \quad (\text{Eq. 3})$$

or

$$NF = 10 \log (1 + T/290) \quad (\text{Eq. 4})$$

where NF is the noise figure (dB) and 290 represents a standard temperature of 290 K (17°C)

Noise Temperature of Antennas

The noise temperature of a perfect antenna is determined by the noise temperature of the object at which the antenna is aimed. This includes the noise temperature of objects in the antenna's minor lobes. If the antenna is looking at the ground, which is at a physical temperature of around 290 K (17°C), it will have a noise temperature of 290 K. If the antenna is looking at the sky, its noise temperature will depend on the noise temperature of the region of the sky the antenna sees. At frequencies above 1 GHz, most of the sky is quite cold (at 3-cm wavelength, the background radiation from the sky is 2.7 K).

An average value of antenna temperature when the antenna is pointing at the coldest part of the sky will be around 30-40 K (this includes

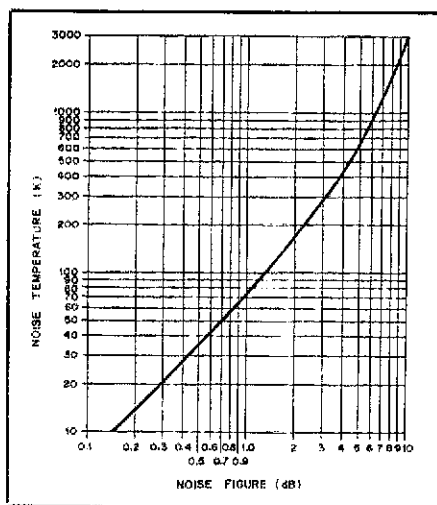


Fig. 1 — There is a logarithmic relationship between noise figure and noise temperature.

Table 1
Solar Flux†

Frequency	F (Min)	F (Max)
1.3 GHz	36	58
2.3 GHz	53	81
3.4 GHz	76	109
5.6 GHz	129	171
10 GHz	269	324
24 GHz	1046	1053

Note: F(min) represents the level of the quiet sun; F(max) represents the level of the active sun. Both values are approximate.
†units of $10^{-22}\text{W m}^{-2}\text{Hz}^{-1}$

some contribution from minor lobes seeing the ground). If the antenna sees the sun, its noise temperature depends on its gain (what proportion of the antenna's main lobe does the sun fill?) and the frequency (the sun exhibits different noise temperatures at different frequencies since its noise output is not purely thermal in nature). The sun's noise output is also dependent to some extent on its activity (sunspot number). An approximate antenna temperature is given by

$$T_a = (FG \cdot L^2)/(3.468) \quad (\text{Eq. 5})$$

where

- T_a = antenna temperature looking at the sun
- F = solar flux (see Table 1)
- G = antenna gain as a ratio (e.g., 13 dB G = 20)
- L = wavelength (meters)

Checking Receiver Performance with Sky, Ground and Sun Noise

Since we can change an antenna's noise temperature by aiming it at different objects, we can use it as a variable noise generator. This, in turn, can be used to obtain a measure of receiver performance in the following way. The noise temperature of a receiving system

is the sum of the receiver noise temperature, the antenna noise temperature and the noise temperature of the feed line connecting the antenna to the receiver. The feed line noise temperature is related to its attenuation by the relationship

$$T_f = (L - 1) T_p \quad (\text{Eq. 6})$$

where

- T_f = feed line noise temperature
- L = line loss as a ratio (e.g., 3 dB L = 2)
- T_p = physical temperature of the feeder (K)

Since noise power output is directly proportional to noise temperature (Eq. 1), the noise output of the receiving system will be proportional to its noise temperature which, all else being fixed, will be dependent on antenna noise temperature. Take, for example, the following system, a 10.368-GHz receiver with a 10-dB noise figure and a 1-meter-diameter dish. A 10-dB noise figure corresponds to a noise temperature of 2611 K (from Eq. 3). The antenna temperature when pointing at the coldest part of the sky will be around 30 K. The antenna temperature when pointing at the sun can be calculated from Eq. 5. A 1-meter dish has a gain of about 5900 (37 dB), and thus will have a noise temperature of 460 K with a solar flux value of 300 at 10.368 GHz. Thus, when the receiver is pointed at the cold sky, the noise power output will be proportional to 2641 K (2611 + 30; rx + sky). When it is pointed at the sun, the noise power out will be proportional to 3101 K (2611 + 30 + 460; rx + sky behind the sun + sun). The ratio of these two powers is

$$3101/2641 = 1.174 = 0.70 \text{ dB}$$

Note that these numbers assume no image response in the receiver. If the receiver does have an equal image response, antenna temperatures will appear to be twice as great (since equal amounts of noise will simultaneously be received on both the signal and image frequencies). With the same system, the ratio of cold sky to ground noise will be (2611 + 290; rx + ground)/(2611 + 30; rx + sky):

$$2901/2641 = 1.098 = 0.41 \text{ dB}$$

The receiver noise power output can be measured with an audio (ac) voltmeter. The measured power ratio for sun noise is then

power ratio =

$$20 \log \frac{(\text{noise voltage with antenna on sun})}{(\text{noise voltage with antenna on cold sky})} \quad (\text{Eq. 7})$$

Note that the receiver must be operating under linear conditions; i.e., the AGC must be off (or in the case of FM the receiver must be well below limiting).

Changes in equipment can be assessed by measuring sun/sky and ground/sky noise. Improvements in the system noise figure will give rise to higher values. Note that the sun is variable in output, so sun/sky measurements made over a period of time are subject to variation.

*103 Division Ave., Millington, NJ 07946

On Line Sources

Conducted By Stan Horzepa,* WA1LOU

The computer in Amateur Radio is a phenomenon that is growing by leaps and bounds. Pick up any recent issue of *QST* and you will find numerous advertisements for Amateur Radio computer hardware and software. Besides these advertised sources, there are some other sources that have been brought to my attention. Some are free, some are not, but all are worth mentioning because they may enhance your radio-computer operation.

VIC-20 RTTY: Malcolm Mallette, WA9BVS, has developed a RTTY program for the VIC-20 with 8kbytes or more of RAM. The program runs ASCII or Baudot at the standard speeds with type-ahead, split-screen and other features. This machine language is in public domain; it can be downloaded from the Compuserve VIC SIG (data base 8, telecommunications). A documentation file with complete instructions is also available.

Azimuth and Distance Offer: To obtain DX azimuth and distance data for your QTH, send an s.a.s.e., your QTH latitude and longitude, and a check for \$5 (or more) payable to AMSAT to Buzz Gorsky, WH6I (ex-K8BG), 1629 Wilder Ave., Apt. 1003, Honolulu, HI 96822. Buzz also generously offers a TRS-80[®] Model I program that will search for the desired DX azimuth and distance data to anyone who sends him an s.a.s.e., latitude and longitude, a diskette and a check for \$10 (or more) made payable to AMSAT.

Timex Lives On: The Timex Sinclair Amateur Radio Users Group (TSARUG) and QZX, the TSARUG journal, will continue despite the demise of the Timex computer line. QZX publisher Alex Burr, K5XY, assures us that TSARUG membership is growing and will continue to provide information to old and new Timex owners. Alex also mentions that the RTTY issue of QZX is still available. For information, write to K5XY, 2025 O'Donnell Dr., Las Cruces, NM 88001.

40-Meter MSO: The WB4ZQB MSO operates daily on 7.0878 MHz. The system uses 110-baud ASCII Wednesdays and weekends, and 74-baud Baudot all other times. MSOZQB brings up the MSO, which is under the control of a HAL DSK 3100.

Magic City RBBS: An Amateur Radio bulletin board system is on line in Billings, Montana. Dave Williams, N7ATT, runs the Magic City RBBS on his IBM PC 24 hours a day, with a message data base, a ham-related software library and current Amateur Radio news. The board operates at 300, 450 and 1200 bauds, and uses 7 data bits-1 stop bit-even parity or 8 data bits-1 stop bit-no parity. The number to call is 406-256-8717.

IBM Contest Duping: J. R. Hendricks, KF4KS, has developed a software package for the IBM-PC and PCjr (using DOS 2.0 or 2.1) that is specifically designed for Field Day dupe checking and checklist reporting, but it can be used for any contest as well. For more information, send an s.a.s.e. to KF4KS, 1204 Oxford Pl., Cary, NC 27511.

Schematics on the Color Computer: Schematic Drafting Processor is a program that allows you

On Line Net Directory

Net Freq.	Time	Day	QTH	
Apple Computer User's Net	145.21	1900L	Su	Belleville, IL
Atari Microcomputer Net	3.980	2000E	W	E. Coast
	7.230	1800Z	Su	Northwest
	7.230	1800Z	Su	Southwest
	7.235	1800Z	Su	Southeast
	7.235	1830Z	Su	Midwest
	7.235	1100P	Su	W. Coast
	14.325	1800Z	Su	U.S.
	21.400	2330Z	Th	World
	145.85	2000E	W	Central KY
	146.445	Continuous		Dayton
	147.57	Continuous		Chicago
CPM User's Computer Net	3.968	0300Z	Su	U.S.
Computer Nut Net	3.939 [†]	1430Z	Sa	U.S.
	7.232 [†]	1430Z	Sa	U.S.
PET Net	14.190	1200C	Su	World
QZX Net (Timex/Sinclair)	3.600	1930Z	W	Europe
	3.980	0100Z	Sa	E. Coast
	4.020	0000Z	W	Los Angeles (MARS)
	7.228	1900Z	SaSu	E. Coast
	7.235	1700Z	Sa	W. Coast
	7.240	1800Z	Su	E. Coast
	7.245	0001Z	W	U.S.
	14.150	1900Z	Th	Europe
	14.200	1000Z	SaSu	Europe
	14.200	1400Z	Sa	Europe
	14.329	2000Z	Su	U.S.
	14.345	0100Z	Th	U.S.
	146.04	0100Z	Th	Pittsburgh
	146.16	0000Z	Th	VT/INH
	146.67	0230Z	Tu	NYC
	147.84	0000Z	W	New Orleans
So. Calif. Packet Radio	145.36	night	M	So. CA

[†]Standard Time freq.

^{††}Daylight Standard Time freq.

PX: Novice Exams and Antenna Time!

Want a program that will select question numbers at random from the FCC's Novice-question pool, PR 1035-A? George Thurner, W8FWG, designed it for a Radio Shack TRS-80 Model I Level II BASIC microcomputer. Ask for PX program number 45. (For more information, see June 1984 *QST*, page 48.)

The weather is good, so now is the time to go outside and do some pruning... antenna pruning. The following four additions to the FX library may make the job easier.

PX program number 46 is a TRS-80 Color Computer program that calculates antenna lengths. Written by Brian Carling, AF4K, it requires 18k Extended BASIC.

PX program number 47 is a TRS-80 Color Computer version of KE6H's BASIC antenna modeling program that appears in February 1981 *QST*. The conversion was performed by Len Weber, N0CXV.

PX program number 48 is a VIC-20 BASIC program that designs Yagi antennas. It was submitted by Ken Minkiel, KA2FEW.

PX program number 49 is Joe Frankiewicz's (KB9MW) BASIC Yagi antenna design program for the TRS-80 Model III.

Once you get those antennas up and running, the following programs will help you put all that aluminum to good use.

PX program number 50 calculates antenna headings for DX countries. This BASIC program was written for an Apple II by Donald Wurster, KC8YX.

PX program number 51 is a PASCAL conversion of W6ZGN's VHF/UHF propagation program that appears in July 1983 *QST*. T. W. Childers, N5GE, performed the conversion.

To obtain a listing of any of these programs, send an s.a.s.e. (preferably no. 10, business-size) with 37 cents postage (54 cents for program number 50) to ARRL, Dept. PX, 225 Main St., Newington, CT 06111. Use a separate s.a.s.e. for each program request and write the PX program number of the desired program at the lower left-hand corner of the envelope. Please do not send correspondence other than PX program requests to Dept. PX at ARRL Hq.

to draw, save and print schematics with a TRS-80 Color Computer (with 64kbytes of RAM and one disk drive). Move the cursor around the video display and hit the right combination of keys to

place predefined electronic symbols where desired. Lines can be drawn to connect the symbols, and text can be used to label them. When a schematic is completed, it can be saved on disk or printed on a graphics printer.

For more information, send an s.a.s.e. to Spectrum Projects, 93-15 86th Dr., Woodhaven, NY 11421.

TRS-80 Logbook and CW Trainer: Clint Sprott, W9AV, has written two programs for the TRS-80 Models I, III, 4 and Color Computers. "Amateur Radio Logbook" permits storage, editing and display of log entries with output to CRT screen, printer, cassette or disk. Automatic duping of call signs for contest operation is another feature.

"Morse Code Trainer" generates random characters and tests keyboard response. The program is self-pacing, to allow beginners or experts to increase their CW proficiency.

Both programs are available from Clint Sprott, 5002 Sheboygan, No. 207, Madison, WI 53705. Send an s.a.s.e. for complete details.

W6OVP Teaches TRS-80 Model 4/4P BASIC: Learning TRS-80 Model 4/4P BASIC is a new book written by David A. Lien, W6OVP. It is the latest addition to his continuing series of books that have taught BASIC to thousands of TRS-80, IBM PC and Timex/Sinclair users. Using simple step-by-step instructions, the book guides the user through the basics and the finer points of BASIC (as implemented by the TRS-80 Models 4 and 4P). Check your local book emporium for a copy, or write to Compusoft Publishing, 535 Broadway, El Cajon, CA 92021.

On Line Net Directory: The new installation of the On Line Net Directory accompanies this column (see sidebar). These computer-related nets provide an ongoing source of information for hams with computers; be sure to check in and check them out. (If your net is not included in the list, please let me know about it for the next installment of the Directory.)

SEEKING SOURCES

KB9UZ wants to use his Commodore 4032 Pet computer to receive CW and RTTY. If anyone has information that will do the trick, please write to John Hamilton, KB9UZ, 6050 North Oakley Ave., Chicago, IL 60659.

If you have a Coleco Adam computer and use it to transceive CW and RTTY, please pass along the good news to new Adam hacker Art Dullinger, K1WZT, P.O. Box 15, Kezar Falls, ME 04047.

Gary Payne, KE6CZ, is looking for Commodore 64 program conversions for three programs that appeared in February 1981 *QST*: Antenna Modeling Program for the TRS-80, Vertical Array Analysis and Combined Vertical Directivity. If you have converted any or all of these programs for the C-64, Gary would appreciate hearing from you. He is at 1347 E. Dakota, Fresno, CA 93704.

PX CORRECTIONS

The following are fixes to programs that have been distributed via PX. If you had a problem with either of these two programs, a remedy might be found here.

PX Number 31: NSCHN points out some errors in the Morse Code Generator program for the TI-99/4A: in line 1920, change "FOR R = 1 TO 18" to "FOR R = 1 TO 21"; in line 3570, replace the comma between the words "COMMA" and "PERIOD" with a blank space; in line 3860, insert "WHAT?" two spaces after the period following the word "HOT."

PX Number 36: W0EO discovered an error in his VIC-20 robot QSO program. Rod says there should be no space between the quotation marks in program line 430.

*75 Kreger Dr., Wolcott, CT 06718

Diary of a World Traveler

You are a YL. You are operating from a rare, exotic spot on earth. You're on a DXpedition and you're thrilled. It would seem that the entire Amateur Radio community is standing by, awaiting a turn just to contact you. Invariably you'll be asked: "Are you Iris?"

Why? Because Iris Colvin, W6QL, and her OM, Lloyd, W6KG, have undoubtedly operated from more countries in the world than any other living Amateur Radio operators. Since 1965, they have been on the go to many corners of the world, racking up QSOs in numbers almost beyond comprehension to the average ham. Is there an operator among us who hasn't sent to the famous YASME Foundation for one of their QSL cards?

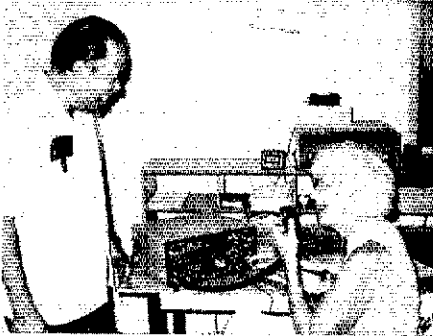
Iris and Lloyd's operating diary for just the past few years is something to behold. In the first part of 1982, they visited and operated from Guyana in January, Suriname and French Guiana in February, then in Curacao, Netherlands Antilles, in March using the calls W6QL/8R1, W6KG/PZ1, FY0FOL and W6QL/PJ2, respectively. All told, they made 56,000 contacts in four months of on-the-air time.

They normally try to divide their time between CW and SSB. They try to use Iris's call in one country and then Lloyd's in the next. This makes it easier for the hard-working YASME QSL Managers, having to handle only one call per country.

They returned to the United States in time for the Dayton Hamvention and the joint meeting of the Northern and Southern California DX Clubs in Visalia, in April 1982. The year was far from over, however, as October found them operating from Djibouti in East Africa with the call J20DU, and then on to Abu Ail, as G5ACI/AA, where they were joined by F0ECV and F6GBQ. Abu Ail, an international island in the Red Sea, is listed as a separate country on ARRL's countries list. On a clear day, Ethiopia can be seen to the west, and North Yemen to the east. This proved to be one of their more difficult and dangerous DXpeditions, but was made successfully. Operating two stations continuously for 41 hours, they made 4000 QSOs with hams in 104 different countries on five bands, including the new 10-MHz band.



Iris Colvin, W6QL, visiting the shack of Father Dave, CE0AE, on Easter Island.



PZ1BS visiting Iris, W6KG/PZ1, in Paramaribo, Suriname.

Iris and Lloyd's operating diary for 1983 is equally exciting:

January 8, 1983 — Corniche-Muscat-Sultanate of Oman, Arabian Gulf — Operating as W6KG/A4, we have just completed operation here in Oman, having made 5000 QSOs with amateurs in 127 countries. We lived in and operated from a hotel, and were concerned over the possibility of TVI. Our fears proved to be groundless, as we learned that TV here operates on UHF instead of VHF, as in America and some other countries — something we will remember when visiting countries in the future.

April 5, 1983 — Amman, Jordan — Our operation as JY8KG has just been concluded, having


made 8500 QSOs with amateurs in 131 countries. We have made approximately 50,000 QSOs during the last half year's operation. We have visited all of the Arab countries of the world except Iraq. Without exception, the top communication officials in these countries have an understanding of Amateur Radio and are favorable toward it.

November 1, 1983 — Bogota, Colombia — As W6QL/HK3, we have just completed making 6000 QSOs with amateurs in 133 countries. With the help of HK3NBB, a new YASME director, and the Amateur Radio Club of Colombia (Liga Colombiana de Radioaficionados), we were assigned our calls almost immediately. We found that many of the persons in the amateur licensing field are women. For example, the YL in charge of license applications from the club to the Government is HK3AVH. The Chief of the Government licensing section is also a YL who works with the Vice Minister of Communications, another YL. HK3FKL, still another YL who speaks excellent English and Spanish, helped us and acted as interpreter on several occasions.

December 7, 1983 — Quito, Ecuador — Quito is located on the equator, but it is very high in the Andes Mountains. We have just concluded operation at W6QL/HCl, having made nearly 5000 QSOs with 120 countries. From our operating position, we can see several snow-capped volcanos. There have been two earthquakes during our stay — strong enough to rock the operating table. We attended our first bullfight — something everyone should witness at least once. Both here and in Colombia, the major radio clubs hold meetings every week — something not often done in the United States. The Quito Amateur Radio Club is a very active organization, with one of the finest buildings and antenna sites anywhere.

December 22, 1983 — Galapagos Islands — In 11 days of operation as W6KG/HC8, we made some 6000 contacts with 120 countries represented, working all bands. We were probably the first station from here on 30 meters. Upon our arrival, we met Bud, HC8GI, and are sorry to report that three days later he became a Silent Key. He had been the most active amateur on the Galapagos Islands for many years, and will be greatly missed throughout the world. Next stop Peru, with 4T4WCY as our call.

The Colvins' travels continued on to include Asuncion, Paraguay, W6QL/ZP5; Isla de Pascua (Easter Island) as W6KG/CE0; and Juan Fernandez, appending /CE0. They learned that CE0A is not necessarily an Easter Island call, nor is CE0Z necessarily Juan Fernandez. The sure way to know where a CE0 station is located is to either ask him or wait for his QSL.

Iris and Lloyd returned from their half year of operating in far-away places in April 1984. They had visited 13 countries and made DXCC under nine different calls, for a total of 55,000 QSOs. With six months left to go this year, where in the world will the Colvins be next? 

*Country Club Dr., Monson, MA 01057

Strays

QST congratulates...

Forrest Smith, KF0V, of Carterville, Missouri, on receiving certificates of appreciation from the Missouri Emergency Preparedness Office and the Joplin-Jasper County Emergen-

cy Preparedness Agency for his efforts in the SKYWARN Weather Net Program.

Ron Henson, WB5TTU, of Hugo, Oklahoma, on being appointed Civil Defense Director for Choctaw County.

Eric Neil Schreiner, KA4VTP, of Sanford,

North Carolina, on being selected to the Society of Distinguished American High School Students.

ARRL Technical Advisor Ed Wetherhold, W3NQN, of Annapolis, Maryland, on being chosen cowinner of the annual *Short Wave Magazine* article competition.

Coming Conventions

OKLAHOMA STATE CONVENTION

July 21-22, Oklahoma City

Central Oklahoma Radio Amateurs will host Ham Holiday and State ARRL Convention at the Lincoln Plaza Inn & Conference Center, 4445 Lincoln Blvd. The program includes FCC, ARRL officials, DX, packet radio, satellites, computers with RTTY and a host of other special-interest events appealing to both the OM and YL. All activities will be under one roof, with free parking for cars and self-contained RVs. Dealer displays will be open Saturday and Sunday. The flea market will be open Saturday only. Reservations mailed by July 6 will be \$8; at the door, \$10. Saturday evening banquet ticket: \$14. Sunday QCWA breakfast: \$7.20. Reserved flea market table, \$5; at the door, \$8. Hotel reservations: \$47 (plus tax) for a double; call 800-522-8034 or 800-654-8419 (out-of-state). Mail reservations to CORA, P.O. Box 44091, Oklahoma City, OK 73144.

IDAHO, MONTANA AND UTAH STATE CONVENTION

August 3-5, Jackson, WY

What other convention can offer the scenic beauty of Yellowstone and Teton Parks, great fishing on Jackson and Jenny Lakes, thrilling raft rides down the Snake river, scenic horseback rides in the heart of the Rockies, or the fun of the famous "Million Dollar Cowboy Bar"? Come to the 52nd WIMU Hamfest at the Virginian Motel and see for yourself. We may not be the biggest, but we are the *Best in the West*. There will be great fun for all in this vacation paradise, including family activities, swapfest and dealers. Mobile, homebrew and software competitions. For special room rates, call 307-733-2792 and mention "hamfest." For

June 30-July 1

West Virginia State, Weston (Jackson's Mill)

July 7-8

Indiana State, Indianapolis

July 20-22

Oklahoma State, Oklahoma City

August 3-5

Idaho, Montana and Utah State, Jackson, WY

August 4-5

North Florida Section, Jacksonville

August 18-19

Southeastern Division, Huntsville, AL

August 26

Illinois State, St. Charles

September 1-3

Pacific Division, Santa Clara, CA

September 15-16

Delta Division, New Orleans, LA

September 22-23

Roanoke Division, Virginia Beach, VA

September 29-30

New England Division, Boxboro, MA

September 29-30

Great Lakes Division, Louisville, KY

ARRL NATIONAL CONVENTIONS

July 20-22, 1984

New York, New York

October 4-6, 1985

Louisville, Kentucky

September 5-7, 1986

San Diego, California

June 19-21, 1987

Atlanta, Georgia

more information, contact Betty Naylor, N7BGC, 1851 Herbert Ave., Salt Lake City, Utah, 84018, tel. 801-582-6691.

NORTH FLORIDA SECTION CONVENTION

August 4-5, Jacksonville

The 11th annual North Florida Section Convention will be held at the Orange Park Kennel Club on U.S. 17 S. near I-295, from 8 A.M. to 5 P.M. Saturday and

from 9 A.M. to 3 P.M. Sunday. Manufacturers and equipment distributors will be present. Large swap area. A full slate of forums and programs is scheduled across the street at the Best Western First National Inn. Registration is \$4. Swap tables are \$9 for one day or \$15 for the weekend. Special discounts and promotions are available to exhibitors who contract for space before July 15. Special room rates available. For more information, contact Mike Parmin, N4EPD, 6716 Diane Rd., Jacksonville, FL 32211.

Hamfest Calendar

By Marjorie C. Tenney,* WB1FSN

[Attention those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.]

Arizona (Flagstaff) — July 20-22: The Amateur Radio Council of Arizona will hold a hamfest at the Fort Tuthill Fair Grounds. For more information, contact Lee Pemberton, 6565 N. 17th Ave., No. 1, Phoenix, AZ 85015, tel. 602-242-3687.

British Columbia (Trail) — August 4: The Beaver Valley ARC will hold a Swap Fest beginning at 10 A.M. at the Cominco Arena. Talk-in will be on 84/24. For further information and table reservation, contact BVARC, c/o 3798 Woodland Dr., Trail, BC V1R 2V7.

California (Pomona) — August 4: The Tri-County ARS will hold their annual Hamfest at Palomares Park Recreation Hall, 491 E. Arrow Hwy. (north side of Arrow Hwy. at Orange Grove, between Towne and Garey) from 8 A.M. to 4 P.M. All indoors. Food and drinks. Free parking. Admission: \$1. Programs on direction finding, solar power and other topics. Examinations for Novice, Technician, General and Advanced class licenses will be given if possible. Swap tables are available and must be reserved for \$5. Table setup begins at 7 A.M. Talk-in on 146.025+. For further information, contact Joe Lyndon, WB6UFX, 6879 Sard St., Alta Loma, CA 91701, tel. 818-444-9275 or 714-980-4563. For advance registration, make checks payable to TCARA and include an s.a.s.e.

Colorado (Glenwood Springs) — July 28: The Ski

Country ARC will hold its third annual swapfest from 9 A.M. to 3:30 P.M. at the CMC building, 1402 Blake. Guest speakers and demonstrations. Full tables available for \$5; half tables for \$3. Talk-in on 07/67. For further information, contact Bob Ludtke, K9MWM, 1001 Grand Ave., Glenwood Springs, CO 81601, tel. 303-945-5966.

Illinois (Downers Grove) — July 8: The DuPage ARC Hamfest/Computerfest will be held at American Legion Post 80. Large outdoor flea market and swappers row. Indoor commercial exhibits. Admission: \$2, \$3 for swappers row sellers. Talk-in on 145.49 or 223.74. For more information, send an s.a.s.e. to W9DUP, P.O. Box 71, Clarendon Hills, IL 60514, tel. 312-971-3298 (between 8 A.M. and 9 P.M.)

Illinois (Belvidere) — July 28: The Big Thunder ARC will hold its 18th annual Hamfest at the Boone County Fairgrounds, Rte. 76, from 7 A.M. to 2:30 P.M. Inside facilities in case of rain. Donations: \$2 advance, \$2.50 at gate. Free Saturday night camping. Electrical hookups available for a fee. Free swap area, fee for tables. Talk-in on 975/375, 52. For further information, contact Jim Grimsby, W9HRF, 210 Oak Lawn La., Poplar Grove, IL 61065, tel. 815-765-2573.

Illinois (Palmyra) — July 21-22: The Quad-Co. ARC will sponsor the 27th annual Breakfast Club Hamfest at Terry Park, 3/4 of a mile east of Palmyra. Bring swap gear. Dancing and movies Saturday night. Sandwiches and soft drinks available. Games, contests, golfing and fishing. Camping facilities open Friday afternoon to Monday morning. Talk-in on 3.973 MHz. For further information, write to "Hamfest," c/o Quad-Co. ARC, 602-D E. Walnut, Chatham, IL 62629.

Indiana (Angola) — August 5: The Steuben County Radio Amateurs will present the 26th annual FM picnic and hamfest at Crooked Lake. Overnight camping will

be available (with fee); inside tables; and barbeque chicken. Admission: \$2.50. Talk-in on 81/21 and 52. For more information, contact Donn W. Laird, WB9YIT.

Michigan (Petoskey) — July 21: The Straits Area ARC annual swap-shop and computer demonstration will be held at Emmet County Fairgrounds 4-H building from 9 A.M. to 2 P.M. Table setup at 8 A.M. Tables are \$3 each; admission is \$2.50. RV camping nearby. Talk-in on 146.67 and 52. For more information, contact Irene Stein, KA8NKS, 4487 Robinson Rd., Pellston, MI 49769, tel. 616-539-8986.

Missouri (Washington) — July 15: The Zero-Beaters ARC will hold their 22nd annual Hamfest at the Washington Fairgrounds in the Bernie H. Hillermann Park from 9 A.M. to 3 P.M. Admission: \$2 or 3 for \$5. Refreshments, flea market and more. Limited rental space available; reservations recommended. Talk-in on 24/84, 52. For more information or tickets contact the Zero-Beaters ARC, Box 24, Dutzow, MO 63342, tel. 314-239-2072.

Montana (East Glacier) — July 20-22: The Great Falls Area ARC presents the 50th Annual Glacier-Waterton International Hamfest at Three Forks Campground on the southern edge of Glacier National Park. Activities include 2-m transmitter hunts, QCWA meeting and contests. Preregistration is \$8.50 and includes Saturday night dinner (bring own meat and utensils) and Sunday morning breakfast. Talk-in on 34/94 and 52. For more information send s.a.s.e. to Shirley Smith, KC7OA, 1822 14th Ave. South, Great Falls, MT 59405.

New Hampshire (Manchester) — July 14: The New Hampshire FM Association will sponsor New Hampshire's 2nd largest Amateur Radio/electronic fleamarket at the Manchester Municipal Airport, starting at 9 A.M. Rain date is July 15. Admission: \$1;

*ARRL Hamfest

*Convention/Travel Coordinator, ARRL

sellers, \$5. Sellers should bring their own table or tailgate. Commercial displays welcome. Refreshments available. Talk-in on 52. For more information or pre-registration, contact Dick DesRosiers, W1KGZ, tel. 603-668-8880, or Doug Aiken, K1WPM, 30 Meadowglen Dr., Manchester, NH 03103, tel. 603-622-0831.

†New Jersey (Edgewater Park) — July 15: The West Jersey Radio Amateurs will hold a hamfest at the Super 130 Drive-In Theatre from 9 A.M. to 3 P.M., rain or shine. Registration and tailgating: \$3 each. Vendor setup at 7 A.M. (bring your own table). For more information, send an s.a.s.e. to Mary Lou Shontz, N2CLX, 107 Spruce La., Rte. 16, Mt. Holly, NJ 08060, tel. 609-267-3063.

†New Jersey (Augusta) — July 14: The Sussex County ARC will sponsor SCARC '84 at the Sussex County Fairgrounds, Plains Road, off Rte. 206, at 8 A.M. Admission: \$2. Indoor tables: \$5 in advance, \$6 at the door. Tailgate space: \$4 in advance, \$5 at the gate. Food and refreshments. Talk-in on 90/30 and 52. For more information, contact Donald R. Stickle, K2OX, Weldon Rd., RD #4, Lake Hopatcong, NJ 07849, tel. 201-663-0677.

†New York (LaGrange) — July 14: The Mount Beacon ARC will hold the Mount Beacon Hamfest from 8 A.M. to 3 P.M. at Arlington Sr. High School-North Campus. Admission: \$2. Tailgating: \$3. Tables: \$4 each. Activities include a demonstration of amateur television (ATV). Talk-in on 37/97 and 52. For more information, contact Art Holmes, WA2TIF, 2 Straub Dr., Pleasant Valley, NY 12569, tel. 914-635-2614.

†North Carolina (Asheville) — July 28-29: The Western Carolina ARS will hold their hamfest and computer fair at the Buncombe County Firemans Training Center. Preregistration: \$3.50; at the door, \$4 (both days). Indoor dealers' display, outdoor flea market, forums, CW competition and camping area (no hookups). Talk-in on 31/91, 16/76 and 52. For more information write to WCARS, c/o Nelda Williams, KA4WPM, P.O. Box 1488, Asheville, NC 28802.

North Carolina (Cary) — July 21: The Cary ARC will hold their 12th annual mid-summer swapfest at the Lions Club shelter, near Cary High School, from 9 A.M. to 3 P.M. Free admission. Auction. Talk-in: 28/88, 75/15 and 52. For more information, contact the Cary ARC, P.O. Box 53, Cary, NC 27511.

†Ohio (Wellington) — July 21: The Northern Ohio Amateur Radio Society will hold NOARSFEST at the Lorain County Fairgrounds at 8 A.M. Setup at 6 A.M.

Admission in advance, \$3; at the door, \$3.50. Children under 12 free. Flea market: \$1 per car space. Large indoor exhibit hall. Campers may park overnight Friday for free. No hookups. Dealer indoor exhibit space with 8-ft tables at \$8 each. An FCC communications van will be on site, along with QCWA and ARRL booths. For advance registration, contact John Paul Jones, WA8CAE, 4612 Timberview Dr., Lorain, OH 44052, tel. 216-282-4256.

Ontario (Toronto) — July 20-22: The Association of North American Radio Clubs will sponsor its annual convention at the Ramada Renaissance Hotel. The convention emphasizes DX on all frequencies (not only the ham bands). This year's convention is hosted by the Ontario DX Association, and will include dealer displays and forums with broadcasters from around the world. For more information, write to ANARCON 84, P.O. Box 232, Station Z, Toronto, ON M5N 2Z4, Canada. Please include an envelope and unattached stamp (3 IRCs outside North America).

†Pennsylvania (Pittsburgh) — August 5: The 47th annual South Hills Brasspounders and Modulators hamfest will be held from 9 A.M. to 4 P.M. at the South Campus of the Community College of Allegheny County. Tickets are \$3 each, 2 for \$5. Indoor and outdoor flea market space. Talk-in on 13/73 and 52. For more information, contact Jack B. Wood, 448 Jenne Dr., Pittsburgh, PA 15236.

†Pennsylvania (State College) — July 14: The Nittany ARC will host the Mount Nittany Hamfest at the Firemans Fair Grounds in Pleasant Gap at 8 A.M. Admission \$3. Talk-in on 16/76 or 25/85. For more information, contact Dave Buckwalter, KC3CL, tel. 814-238-4311 or 814-234-0759.

South Carolina (Charleston) — July 14-15: The Charleston Amateur Radio Society will host their annual hamfests at the Omar Temple. For more information, contact the Hamfest Committee, P.O. Box 70341, Charleston Heights, SC 29405.

Tennessee (Crossville) — July 21-22: The Cookeville Repeater Association and the Plateau ARC will hold the annual Crossville hamfest at the Cumberland County Community Complex, Hwy. 70N. Talk-in on 69/09 and 93/33. For more information, contact PARC, P.O. Box 2621, Crossville, TN 38555.

Tennessee (Nashville) — July 29: The Radio Amateur Transmitting Society will hold the sixth annual Nashville Ham and Computer Fest at the Nashville Municipal Auditorium. Admission is free. Tables: \$5. For more information, send an s.a.s.e. to Willie Porter,

KB4BLI, 4907 Idaho Ave., Nashville, TN 37209, tel. 615-269-9757.


Texas (Canyon) — August 11-12: The Panhandle Radio Club, Inc., will hold their annual hamfest in the Student Activities Center at West Texas State University. Doors open at 8 A.M. each day. Registration is \$6 at the door, \$5 in advance. Activities include a swapfest, commercial distributors, and QCWA, MARS, ARRL, ARES and PTEN meetings. Women's program. Talk-in on 94 and 3.933 MHz. For more information, contact PARC, P.O. Box 10221, Amarillo, TX 79116, or Jim Ogle, WB5UDX, tel. 806-359-1002.

Texas (Levelland) — August 5: The 19th annual Northwest Texas Emergency Net Swapfest & Picnic will be held in the City Park. The event is cosponsored by the Hockley County ARC. This is a family event; bring your picnic basket. Requested registration fee is \$3. Talk-in on 28/88. For more information, contact John R. Bell, W5NGX, 208 Pat St., Levelland, TX 79336.

†Vermont (Charlotte) — August 11-12: The annual BARC International Hamfest will be held at the Old Lantern Camp Grounds. Tickets: \$4 for both days; children under 12 free. Flea market space: \$2; indoor spaces \$5. Overnight camping available. Can-Am tug-of-war. Talk-in on 34/94, 01/61 and 52. For more information, contact Roger, WA1OZE, P.O. Box 312, Burlington, VT 05402.

†Washington (Tacoma) — August 11-12: The Radio Club of Tacoma will present Hamfair '84 at Olsen Auditorium on the campus of Pacific Lutheran University. Registration is \$5, with trailer and dormitory space available at reasonable rates. Saturday night banquet, commercial space and flea market tables available by advance registration. Talk-in on 88/28. For more information, contact Grace Teitzel, AD7S, 701 S. 120th, Tacoma, WA 98444.

West Virginia (Wheeling) — July 22: The Triple States RAC will present its 6th annual Wheeling hamfest at Wheeling Park from 9 A.M. to 4 P.M. Dealers, flea market and auction. ARRL, SWOT, SMIRK booths. Admission, \$3; children under 12 free. Indoor displays. Tables available if reserved. For more information, contact TSARC, Box 240, RD 1, Adena, OH 43901, tel. 614-546-3930.

Note: Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance. 

Moved and Seconded...

(continued from page 60)

16) The status of the proposed joint policy statement on cable television interference by ARRL and the National Cable Television Association (NCTA), which has undergone a number of draft revisions over a period of time, was discussed without formal action.

17) The continuing problem of conflicts with non-government radiolocation users was discussed. On motion of Mr. Nathanson, the following resolution was adopted:

WHEREAS, the Amateur Radio Service is a non-commercial radiocommunication service which provides a substantial public-interest benefit at no cost to the government or the general public, and

WHEREAS, the spectrum demands of the non-government Radiolocation Service are in increasing conflict with those of the Amateur Service, and

WHEREAS, there appears to be no overall national policy guiding the development and deployment of non-government radiolocation systems, and

WHEREAS, absent such a policy, there is no mechanism to ensure that the non-government Radiolocation Service utilizes the spectrum efficiently, and with minimum impact upon other users of the spectrum, and

WHEREAS, there is increasing evidence that many non-government radiolocation systems now in use are not designed with spectrum efficiency in mind, and that the users of such systems do not adequately understand

their obligations to other spectrum occupants, including the Amateur Radio Service.

NOW, THEREFORE, BE IT RESOLVED by the Executive Committee of the American Radio Relay League, in meeting assembled, that Counsel is hereby directed to petition the Federal Communications Commission to open an Inquiry into the spectrum requirements of the non-government Radiolocation Service, with the objective of establishing a national policy which will ensure that allocations to this Service reflect the least possible impact upon other users of the spectrum; and

BE IT FURTHER RESOLVED, that the petition shall seek the Commission's agreement that changes in allocations to this service shall be held in abeyance pending completion of this Inquiry.


18) Activity in the 220-MHz band, and the status of the existing band plan for the band, was reviewed. On motion of Mr. Grauer, the VHF Repeater Advisory Committee was requested to review the band plan for that portion of the 220-MHz band where repeater operation is permitted by FCC, namely 220.5-225.0 MHz, with the objective of bringing the band plan into conformity with present and anticipated future operating requirements, including digital packet radio links. A completed report is requested 30 days prior to the Second 1984 Meeting of the Board.

19) An apparent misinterpretation by staff of the policy governing the amount of ARRL material to be sent to hamfests was discussed. The General Manager assured the Committee that the matter had been clarified, and that the staff would seek the guidance of the Director concerned as to what was appropriate for each event.

20) On motion of Mr. Milius, the General Manager was requested to report to the Executive Committee on the inventory of certificates bearing the signatures of past officers, with the objective of updating existing stock as quickly as is feasible.

There being no further business, the Committee adjourned at 12:06 A.M.
Respectfully submitted,
David Sumner, K1ZZ
Secretary

LIFE MEMBERS ELECTED May 25, 1984

Ruth R. Allport, WB6YVL; William C. Allport, WA6VTL; Richard L. Anglin, Jr., KA6SMQ; George E. Blosser, N4CPV; D. C. Bradford, KZ5Q; Allan F. Burke, WB7WAN; Horace N. Carpenter, N8ESZ; Genevieve G. Dionne, N1CPC; Janet Kay Eymann, WA8WOF; Mike Eymann, W0XM; Galen V. Flinn, WA7EGT; Walter G. Hartman, W6PLX; Gary N. Hauge, N4CHV; Jerrold M. Hornstein, WB4URV; Arthur W. Johnson, N8FNX; Stephen P. Johnson, W0PGM; Daniel G. Lander, K7KN; Alfred A. Lann, III, K3ZO; David E. Pegg, KD9HQ; Wayne C. Sheridan, WD5CMP; William R. Smedley, WD8BDY; David A. Smith, W8YZ; Marilyn Smith, N8FDT; Nathan Sterental, OA4OS/W4; Len D. Wathen, N04R; Irwin K. Welker, AG3D; Sheemon A. Wolfe, W8WSL; Morris J. Young, KN6M. 

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1BJC, William Crawford, Bridgeport, CT
W1DYT, Raymond E. Foster, East Dennis, MA
W1G1L, Bernard A. Laferty, East Hartford, CT
W1GJ, Richard M. Daniels, South Yarmouth, MA
W1KKN, Sidney R. Ballou, Concord, MA
W1VAO, Chester J. Philipott, Wakefield, MA
W1WEM, Thomas J. Regan, Guilford, CT
K2BDA, Carl J. Weik, Allentown, NJ
W2FRA, Thomas J. Hoar, Wood Bridge, NJ
W2ICS, Wallis C. Wetlauffer, Waterville, NY
W2JO, Truman A. Gadwa, Tuckahoe, NY
W2JZS, Henry C. Wackenhuth, Nutley, NJ
W2PRN, Pauline Rand, Ossining, NY
WB2PXD, Nathan N. Bussell, Toms River, NJ
W2QO, Louis C. Hardy, Franklin Lakes, NJ
W2QPK, Donald F. Martin, Tucson, AZ
W2SDA, Harry L. Spencer, Binghamton, NY
WA2UAB, Mabel C. FitzSimmons, Morrisville, NY
KB3B, David M. "Bud" Fisher, Laurel, MD
W3EON, Albert Augenblick, King of Prussia, PA
W3JZA, Erling L. Royland, Newark, DE
WD4AIK, Francisco L. Oroza, Miami, FL
WB4AZO, Raymond F. Beckman, Lakeland, FL
W4BBD, Stanley W. Head, Sr., Columbus, OH
K4BBH, Clifford J. Troutner, Sebring, FL
W4BNG, George B. Patterson, Jr., Shelby, NC
N4BWO, Irby H. Kolb, Eclectic, AL
W4CFA, Clifton Yarbrough, Orlando, FL
K4CFR, Robert J. Brady, Dunedin, FL
W4CW, Frederick H. Gildemeyer, North Palm Beach, FL
W4DQ, H. Pless Woodward, Statesville, NC
N4EYB, Harold A. Murphy, Davenport, FL
WA4FFY, Charles Cleaves, Sr., Memphis, TN
W4GNH, Raymond W. Markham, Leesburg, VA
W4HSV, Clifford H. McCullough, North Port, FL
W4KN, William R. Shuler, Sr., Fairfax, VA
K4KQN, Samuel F. Hamby, Selma, AL
W4LHT, Newton J. Snyder, McLean, VA
KA4PXT, William G. Terry, Miami, FL
WA4RSE, Edward M. Schreiner, West Palm Beach, FL
W4TZJ, John B. Conger, Knoxville, TN

WA4VWE, John L. Swan, Mobile, AL
K4ZZH, William E. Abbott, Waynesville, NC
W5ATK, John C. Cashion, Amarillo, TX
WB5BET, Max V. Attebery, Locust Grove, OK
KC5CE, Jonathan T. Beavers, North Little Rock, AR
KW5D, Joseph I. Wilkerson, Palestine, TX
W5EWS, Richard W. Trevino, Orange, TX
K5FQY, A. G. Vaughan, Los Alamos, NM
WB5JEH, Doris W. Wilkom, Baton Rouge, LA
W5JLY, Earl R. Lawler, Sr., Ajo, AZ
KA5POJ, Judy Loos, Brackettville, TX
W5RKA, Jack B. Vest, Sr., Hemphill, TX
WB5UAO, Harold E. Snellenberger, Pecos, TX
K5WGJ, John C. DeLaughter, Sparkman, AR
*W6AEE, Merrill L. Swan, Arcadia, CA
WA6CEW, Walter L. Hilden, Vacaville, CA
WA6CNX, Howard H. Troup, Napa, CA
KB6DN, Vincent P. Anello, Riverside, CA
KA6GAO, J. Jerome Delaney, San Diego, CA
WB6GYT, Keith Famulener, Palo Alto, CA
KA6IRK, Sheldon Meskin, Glendale, CA
W6LUO, Myron Moyie, Modesto, CA
K6KD, Thomas A. Marshall, San Diego, CA
W6OMU, Joseph P. Forst, North Highlands, CA
WA6ONA, Dallas B. Stuart, Beldona, CA
W6JN, Clifford R. Spiva, Sutter Creek, CA
KB6VD, Jerry Jensen, San Francisco, CA
WB6YCT, Charles J. Ansoms, Granada Hills, CA
N7ASQ, Gilbert K. Moi, Seattle, WA
W7BNS, William A. Litherland, St. Helens, OR
WB7CNZ, Orrin M. Bacon, Springfield, OR
W7GBY, Albert J. Meyer, Powell, WY
KA7JOL, Lawrence R. Delibero, Kalispell, MT
W7LBT, Kenneth Sargent, Coalville, UT
W7LTX, Roland W. Barber, Sun City, AZ
W7MSY, J. Jasper Snow, Provo, UT
W7NTW, Robert J. Stadlander, Beryl, UT
W7QF, William A. Johnson, Woodburn, OR
W7WZ, Rowland W. McCrary, Seattle, WA
W8AJL, Howard Hull, Jackson, MI
WB8CER, Asa C. Draper, Urbana, OH
W8DXZ, Walter Poole, Grafton, WV

W8JIV, Robert L. St John, Dayton, OH
W8LOO, Raymond C. Smith, Youngstown, OH
KA8NOC, Carlton D. Wagner, Belmont, WV
KB8UZ, Joseph M. Pilarsky, Sparta, MI
N9AKQ, Charles M. Haverland, Lisle, IL
KA9AQN, Hermann G. Jahnke, Gurnee, IL
W9KDB, Charles M. Jenney, Jeffersonville, IN
W9KTK, Charles F. Burke, Sun City West, AZ
WA9NRA, James J. Reynolds, Ft. Wayne, IN
K9ONF, Edward M. Meyers, Superior, WI
W9RAG, Steward G. Wall, Terre Haute, IN
K9RC, Raymond C. McDaniel, Washington, IN
W0BH, Earl E. Hampshire, Garnett, KS
W0BPK, Fred W. Herrmann, Minneapolis, MN
KA0BXV, Dan J. Stewart, Baxter Springs, KS
W0DM, Harold L. Sheets, Grand Forks, ND
KA0HJH, Frances H. Baldwin, Mingo, IA
K0KMA, Harry J. Stolpestad, Fosston, MN
W0ORA, Richard E. Johnson, St. Paul, MN
WB0SQQ, Reinhold G. Miller, Denver, CO
WA0WPP, Jon J. Vervair, Minnetonka, MN
K0WZK, Lester R. Sidles, Estherville, IA
WA0ZXE, Robert Miles, Golden, CO
KL7PE, John H. Huber, Fairbanks, AK
VE7CUE, Edward G. Meyer, Vancouver, BC
XE1FFF, Philip E. Kahan, Miguel, Hildalgo, Mexico
ZL4AC, Robert E. "Robbie" Robinson, Dunedin, New Zealand

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

50 Years Ago

July 1934

- The Editor wonders whether, considering the rapid growth of amateur radio and consequent crowding on our bands, newcomers should spend their first year in a restricted portion of the spectrum so they might get their feet wet gradually.
- W2AOE describes some innovative work in radio control by several W2s, with a low-power 56-Mc. station remotely operating a kw. rig on 75 meters, a mile or so distant. It's an ideal break-in situation, and no regulatory restrictions (at least not yet).
- Boston to New York on 5 meters has finally been accomplished via relay. As in the 1914 incident (on a much lower frequency!) that prompted Hiram Percy Maxim to conceive A.R.R.L., Springfield, Mass., played a key part.
- We all should have a means of monitoring modulation when using voice. Because the ideal tool — a scope — is so expensive, W8PK shows us his common (types 80 and 27) tube version to do the job.
- From the League's financial report we see that for the first three months of the year salaries for the entire Hq. staff totaled some \$16,000.
- W7ALH has a compact "transportable" station designed for use in hotels and similar locations with a.c. available, all in a cabinet about the size of a suitcase.
- Rack-and-panel construction is the aim of many, but commercial versions are rather costly. W4CCH built his own from 1- x 3-inch pine for uprights and strap iron brackets to hold equipment shelves.
- Another "do-it-yourselfer" is W3CII, who planted a 50-foot wood pole, mounted a 35-foot girder across its top, made from 3-inch pine flooring and ordinary

plaster lath crosspieces, and installed a six-element vertical wire beam, rotatable.

- Most of us want to build it "just like QST." This issue responds to many inquiries seeking specific circuit values for, among others, the complete "phone transmitter diagram in the License Manual.
- An attractive change from the usual male dominance of "Hamdom" is W3CDQ, who combines feminine charm and professional skills in the frequency lab at the National Bureau of Standards.
- Incandescent lamps can be useful as resistors, but W3AMM points out the differences between carbon and tungsten filaments, and gives current-voltage characteristics for the latter, by wattage ratings.
- The radio op aboard the S.S. *Frank Buck* visited J2HZ in Yokohama, and we get the flavor of Japanese ham radio from his description of a typical station there.

25 Years Ago

July 1959

- The Board of Directors raised membership dues to \$5, the first rise in 11 years, and the Editor undertakes to explain the background for this action. Additionally, the Board approved plans for League representation of the amateur service at the international telecommunications conference in Geneva, Switzerland, later in the year. Staffers WIBUD and WILVQ are accredited as members of the official U.S. delegation, and Canadian Director VE2BE is similarly one of Canada's team.
- The 7094 power tube has low drive requirements, and W8GRY describes his amplifier with a pair of the

tubes in parallel. Resistive input matches most of the newer sideband exciters, and loads the grid circuit for stability.

- Station control, especially break-in or voice control, is often neglected in our operating setups, but we can find some good ideas in several circuits offered by W6JAT.
- W9MUR has built a high-sensitivity front end to work with the now-accepted 2.2-Mc. i.f., of course with crystal filters. Bandswitching is another feature of his unit.
- Why do W4UCH's high-power 50-Mc. amplifiers look like under-sink plumbing? Because the tank circuits are made from half-inch copper pipe, with elbows and other fittings to boot. Tubes like the 100TH or even 450TH, even though triodes, put out plenty of r.f. and maintain stability with simple neutralization.
- WHCP's choice of subject for the aspiring amateur (or licensed Novice) this month is a code-practice oscillator with loud speaker output, using only one transistor.
- Varying capacity in the frequency-generating circuit is a good way to produce f.m., and the new ferroelectric capacitors can do the job well in a ham installation, as W8HG and W8YNT show us.
- W3BWK's "VXO" article in January 1958 QST put some "rubber" in crystal control. Now he has expanded the concept to a form of complete frequency synthesis, using pairs of surplus xtals to achieve almost continuous band coverage.
- The Los Angeles Council of Radio Clubs did a bang-up job of displaying amateur radio's effectiveness to many foreign delegates attending the international technical radio conference in that city. W6MLZ was the spark plug and general coordinator.
- K6CQO made friends with W6LKI, a cerebral palsy victim, and modified a number of telephone dials with code character outputs so that LKJ can send c.w. at about 12 w.p.m.
- W1TS had some successful DX results in limited antenna space — starting with a length of hookup wire suspended from the family clothesline! — *W1RW*

GIVE IT A SHOT

The ARRL Special Service Club Manual (available only to SSCs) is now in the field. The response has been terrific. SSCs and Affiliated Club Coordinators (ACC) say it's the most useful tool they've received in some time. What makes it useful? The same thing that makes SSCs effective: an organized approach. It can work for you, too.

If your club is more than a paper club, you'll do a variety of things every year. Do these sound familiar: monthly meeting, newsletter, weekly VHF net, summer outing, annual banquet, Field Day, SET, a contest or two — probably Sweepstakes or the DX Test, communications for parades, walk-a-thons, Halloween Goblin Patrols or Neighborhood Watches, community support in emergencies (tornado, flood, lost child, etc.), Novice class, repeater ... ? You probably do these things now. Seeing them listed all in one place, however, may surprise you — you belong to a pretty ambitious club!

If you are a bit surprised, think back to how well you've done over the past year. How smooth was your Field Day? Was it the picture of confusion, filled with last-minute scrambling to salvage the weekend? Is your newsletter often late or sparsely populated with interesting articles? Do your members bail out of contests at the first signs of frustration because they don't have realistic expectations of what they can do or how important their scores are to the club aggregate? Are your meetings attended by less than half of your members? Are the meeting programs last-minute fiascos, or lacking completely? If any of these sound familiar, cheer up — we can help. An organized approach may be all you need.

Defining objectives, assessing resources, assigning responsibility, specifying performance standards, ensuring adequate support, following through — all these may sound like just so much mumbo jumbo. After all, you're just an Amateur Radio club — right? But there's another way to look at it. Ask yourselves

- 1) What do we want to do this year?
- 2) Which of our members is most interested in each activity?
- 3) Who owns the equipment we'll need?
- 4) Who can beg, borrow or ... appropriate ... those things we don't have?
- 5) What are our usual problems for a particular event?
- 6) Who's in charge of each event — and has he or she accepted the responsibility willingly?
- 7) Has the person responsible for a project begun the work in sufficient time to get it done right and on time?
- 8) Who's agreed to help the person running a particular activity?
- 9) Do they have the support they'll need?
- 10) Does our President or Activities Chairman check

*Club Program Manager, ARRL

SSC Kudos and Contacts

Congratulations to the League's newest Special Service Clubs. These clubs are recognized for extended efforts on behalf of Amateur Radio and service to their communities. For further information on these clubs, contact them at these addresses.

Birmingham Amateur Radio Club

c/o P.O. Box 803
Birmingham, AL 35201
Club membership — 341

Convair Amateur Radio Club

c/o 9115 Clairmont Mesa Blvd.
San Diego, CA 92123
Club membership — 63

Denver Radio Club, Inc.

c/o 1417 S. Carlan Ct.
Denver, CO 80219
Club membership — 176

East River Amateur Radio Club

c/o 2113 Hamlock Hill
Bluefield, WV 24701
Club membership — 42

Paynesville Amateur Radio Association

c/o Rte. 1, Box 214
Paynesville, MN 56362
Club membership — 8

Platinum Coast Amateur Radio Society

c/o P.O. Box 1004
Melbourne, FL 32902
Club membership — 252

Wide Area Data Group

c/o P.O. Box 3132
Sparks, NV 89431
Club membership — 72

on the progress routinely to help head off problems?

11) Do we remember to thank the crew for a job well done?

Yes, these are different, more "user-friendly" words, but they mean the same as the mumbo jumbo. By taking a little time up front to straighten out those loose ends and weave a tight program for the year, you can't help but be more effective. Set your course and follow through.

Now to let you in on a little secret — the more than 100 Special Service Clubs are radio clubs, a lot like yours, who simply have made a commitment to organize. And the SSC application process? It's merely following a set of guidelines for planning your club's year with the helping hand of your Affiliated Club Coordinator. If you haven't met with your Section's ACC, you've ignored one of your most valuable resources. Your ACC is your local troubleshooter — no one else is likely to have a better appreciation for the problems clubs face in your particular area. And ACCs are ACCs because they care about the effectiveness of clubs in their Sections. What more could you ask for? If you don't know how to contact your ACC, ask your Section Manager; his or her address is listed each month in *QST* on page 8.

To help you from this end (ARRL Headquarters), we're going to focus our attention on helping you overcome the more common problems that all clubs face. Each month in this column we'll deal with a particular problem and relay the solutions that have worked for ARRL's more effective affiliated clubs. Whether you plan to apply to become an SSC or you just want to



Boy Scout Troop 448 at Denver Radio Club station W0TX during the 1983 Jamboree-on-the-Air. Control operator Chuck Ward, NC0A, asst/s.

be more effective as a club, make Club Corner your first stop in *QST* each month. Drop us a note if you have a particularly sticky problem and would like to hear how other clubs have solved it. And if your club has come up with a few novel solutions, let your fellow affiliated clubs know about them — Club Corner is the way to do it! — *Steve Place, WB1EYI, Manager, Club and Training Department*

Strays

AMATEUR RADIO AND THE OLYMPIC TORCH RUN

□ The Olympic Torch Run Caravan was indeed a unique experience for this radio amateur. I spent one week of vacation (the second week of 12 in this historic event) traveling from just north of Philadelphia through Washington, DC, Maryland, Virginia, West Virginia and Pennsylvania, winding up west of Cleveland, Ohio, some 800 miles later.

There is no way an event like this could be performed successfully without the aid of Amateur Radio. Each ham was also qualified as a driver for the 35-foot motor

homes — 37 vehicles and 13 hams. Each ham had a hand-held radio and a mobile rig. Also, the communications van had low-band equipment. An AT&T computer was available as well. (The Torch Run was organized by the Telephone Pioneers of America, a group of past and present employees with 18 or more years of service at AT&T.) Two-meter repeaters were used along the route; sometimes, using two repeaters was more effective — one for the shuttle vans, and the other for everyone else.

Each morning, we were issued the plan for the day (about 50 sheets), maps and the starting repeater frequencies. Local hams were of tremendous help, especially when one of us made a wrong turn or otherwise lost the way. About half the cities were on the map, and less than a quarter of the intersections had signs.

My initial duty was radio operator for the EMS (Emergency Medical Service), or rolling hospital. This vehicle stayed with the runners and security people, and was the only effective link to the rest of the caravan via Amateur Radio. From seven in the morning to after one the next morning, we were on the road with runners, "speeding" down the road at 8 miles per hour. My second job involved radio and pathfinding for one of the sleepers that shuttled runners in and out of the caravan four times a day, and meal stops.

During the week, this ham took the opportunity to run a kilometer with the torch runner — an exercise for which my legs may never forgive me. Aside from some troubles finding our way, the venture was very successful mainly for one reason: The team wanted it to succeed, and it did. It was one super week! — *Jim L. Kerr, K8KJ*

In Training

PUTTING THE NOVICE IN GEAR

The learning session is over in most areas, and it's time to ensure that the new hams you've helped become licensed will get on the air. This, too, is part of your job as an Elmer. Though we are in the midst of hamfest season, acquiring radios is still a problem for the ham too young to visit the 'fests, or the ham bereft (at the moment) of the cold, hard cash needed to take full advantage of the treasures to be found. This month, we'll investigate a few ways to obtain used amateur equipment. We'll also go over specific radios appropriate for Novices.

In his January 1984 QST editorial, ARRL General Manager Dave Sumner, K1ZZ, mentioned the need for amateurs to contribute their used gear to the cause. A few points are worth repeating here:

- A new Novice doesn't need to use top-of-the-line gear. The important thing is to *get on the air*, as soon as possible, with a basically good station. This means:
- If you're a member of a local radio club, a call for assistance will probably get some good results. Radios can usually be borrowed or bought outright.
- Don't set your new Novice up with QRP gear. A ham just getting used to on-the-air procedure and protocol will have enough to think about without the added difficulty of low power. A commanding signal isn't necessary, but the results a pipsqueak signal will give are not going to be encouraging, either.

Over the past year, I've assembled a list of a few companies that deal in used Amateur Radio equipment. Write to these companies, requesting a list of their available used amateur gear.

Amateur Electronic Supply
4828 West Fond du Lac Ave.
Milwaukee, WI 53216
414-442-4200
1-800-558-0411

Amateur Radio Supply of Nashville
615 South Gallatin Rd.
Madison, TN 37115
615-868-4956

Associated Radio
8012 Conser
Overland Park, KS 66204
913-381-5900

Barry Electronics Corp.
512 Broadway
New York, NY 10021
212-925-7000

C-Comm
6115-15th Ave., N.W.
Seattle, WA 98107
1-800-426-6528

Fair Radio Sales
Box 1105
Lima, OH 45902

Ham Radio Center
8340-42 Olive Blvd.
St. Louis, MO 63132
1-800-325-3636

Ham Radio Outlet
2620 West LaPalma
Anaheim, CA 92801
1-800-854-6046

Hoosier Electronics
P.O. Box 3300
Terre Haute, IN 47803
812-238-1456

Madison Electronics Supply
1508 McKinney
Houston, TX 77010
1-800-231-3057

MidCom Electronics
8516 Manchester Rd.
Brentwood, MO 63144
1-800-325-3609

N & G Distributing Co.
7201 N.W. 12 St.
Miami, FL 33126
305-592-9685

Radio World
Oneida County Airport Terminal Building
Oriskany, NY 13424
1-800-448-9338

Slep Electronics
Highway 441, Franklin South
P.O. Box 100
Otto, NC 28763
704-524-7519

Here is a list of the type of used receivers that can be purchased depending on availability. These receivers have been selected on the basis of their overall sensitivity, selectivity and stability.

- R. L. Drake — 2-A, 2-B, 2-C, R-4
- Hallicrafters — SX-101, SX-101A, SX-111, SX-117, SX-146, S-20R, S-40, S-76
- Hammarlund — HQ-100, HQ-110, HQ-129X, HQ-140, HQ-145, HQ-160, HQ-170, HQ-180
- Heathkit — HR-10, SB-300, SB-301, SB-303
- National Radio — NC-173, NC-183, NC-190, NC-270, NC-300, NC-303
- Trio-Kenwood — R-599, R-1000
- Yaesu — FRG-7, FRG-101

The next list is composed of used transmitters that would work well for the new Novice. Their input power levels range from 75 to 150 W, well within the 200-W

PEP output limit allowed by the FCC for Novices.

- Trio-Kenwood — T-599
- E. F. Johnson — Viking Ranger II
- R. L. Drake — 2-NT
- Heathkit — DX-35, -40, -60, -100; SB-401
- Hammarlund — HX-50

A few used transceivers are also good buys for the Novice:

- R. L. Drake — TR3, TR4
- Heathkit — HW-16 (plus the HQ-10B VFO), HW-100, -101, SB-100, -101, -102.
- Hallicrafters — SR-150, -160, -400, -500
- National NCX-3, -5, -500

Some used receivers or transceivers could use some pepping up of their sensitivity, especially on the higher bands. To accomplish this, why not have your new Novice build a simple preamplifier? Not only will his (or her) receiver have a better set of ears, he'll learn a bit about electronics construction.

April 1984 QST has a discussion of just what we want: Doug DeMaw's article, "Receiver Preamps and How to Use Them," pp. 19-23, does an excellent job of covering the basics of preamplifier theory. Several practical circuits are also described. — Leo D. Kluger, WB2TRN, Recruitment Program Manager

TRAINING BRANCH SHUFFLE

We're pleased to report that the Training Branch Shuffle has subsided and we're well on our way to meet the challenges facing us. To accommodate the FCC's need for a "Chinese Wall" between the Training Branch and the Volunteer Examiner Program (which also resides within the Club and Training Department), the responsibility for writing the license manuals was transferred to the Technical Staff. Similarly, the objectives of the Training Branch have been slightly redefined with the emphasis now on the quality of instruction in the field and more effective support of our ARRL Instructor Corps that is now 6300 strong.

With this realignment of responsibilities, Jonathan Towle, WB1DNL, has transferred to the Technical Department from his position as Training Manager. Your new Training Program Manager is John Foss, W7KQW, who has been a ham since 1955 and a Life Member of the League since 1976. John brings with him a wealth of experience in writing, teaching and developing numerous training programs in other fields. Steve Ewald, WA4CMS, in recognition of the fine job he has done in the Training Branch over the past two years, has been promoted to Assistant Training Program Manager.

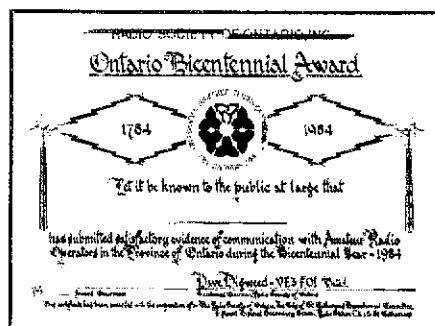
John, Steve and I look forward to working with you, and hope you'll take a few minutes of your time to let us know how we can better serve you in your training efforts. — Steve Place, WB1EYI, Manager, Club and Training Department

Strays



— Kenny Gill, WB5JLZ, of the Baton Rouge ARC, sits in the control room at WKG-TV Video-Electronic College, site of the club station. Avid ATVers, BRARC members hope to have an ATV repeater on line soon.

In a Stray on page 36 of March 1984 QST, we announced the Ontario Bicentennial Award. Here's what you get for your efforts. Start looking for those VE3 and XO3 stations now! —



UoSAT-OSCAR 11 BACK IN SERVICE

On May 14, the University of Surrey command team succeeded in turning on the 145.825-MHz OSCAR 11 beacon. The reason for the 11-week silence has not been fully understood, though the fact that the satellite is now functioning proves that command team vigilance pays off.

ASR (Amateur Satellite Report) numbers 73, 74 and 75 give an OSCAR 11 telemetry-format and system overview. ARRL monthly satellite predictions will now include orbital data for OSCAR 11.

Keplerian Elements

UoSAT-OSCAR 11

Catalog number: 14781.
Epoch time: 84134.14050737.
Sun. May 13 03:22:19.836 1984 UTC.
Element set: 26.
Inclination: 98.2429 Deg.
RA of node: 196.4397 Deg.
Eccentricity: 0.0014596.
Arg. of Perigee: 39.2928 Deg.
Mean anomaly: 320.9333 Deg.
Mean motion: 14.61859953 rev/day.
Decay rate: 1.55e-06 rev/day/day.
Epoch rev: 1058.
Semi-major axis: 7062.392 km.
Anom. period: 98.504648 min.
Apogee: 702.955 km.
Perigee: 682.339 km.
Beacon: 145.825 MHz.

Launch Date Changed for Next Amateur Radio Space Shuttle Experiment

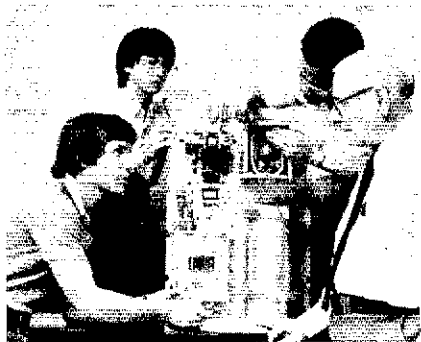
The proposed August launch of STS-17 has been rescheduled for October 5. This is the mission that will carry the Marshall Amateur Radio Club Experiment (MARCE); some details of the mission were explained last month in this column.

Ed Stiuika, W4QAU, has kept ARRL up to date on the latest changes. This month, Ed provides us with the accompanying photo of the student experimenters working on Get Away Special 007 under the watchful eye of the project manager.

Amateur Satellite JAS-1

Shozo Hara, JA1AN, president of the Japan Amateur Radio League, has provided the following information:

The Japan Amateur Radio League, Inc. (JARL), with support from JAMSAT (The Japanese AMSAT), is currently developing a new satellite to be called



Project Manager Konrad Dannenberg (right) oversees student experimenters (l-r) Guy Smith, Jonathan Lee and Arthur Henderson. Not shown is Ed Stiuika, W4QAU, principal investigator for MARCE.

JAS-1. It will be launched by the National Space Development Agency of Japan (NASDA) early in 1986. NASDA has already approved launching JAS-1 with the Experimental Geodetic Payload (EGP) using NASDA's experimental launch vehicle, the H-1 rocket.

Objectives of the JAS-1 satellite are:

- 1) to provide reliable worldwide amateur communications;
- 2) to enable research into satellite control engineering and satellite tracking systems; and
- 3) to test and prove the performance of analog and digital transponders developed by radio amateurs.

A capability of the JAS-1 is its digital transponder with memory, in addition to a normal analog transponder. It will be possible to load into the transponder memory messages which can be relayed upon receipt of an appropriate access code. In this way, JAS-1 will be able to carry messages (on a store-and-forward basis) between amateurs anywhere in the world, though in a non-real-time mode.

Major Specifications

1) Launch

Planned launch: Early in 1986.
Launch vehicle: H-1 rocket.
Launched by: NASDA.
Launching site: Tanegashima, Japan.

2) Orbital Parameters

Orbit: Circular orbit; altitude approximately 1500 km (930 miles).
Period: 120 minutes.
Inclination: 50 degrees.
Projected life: 3 years.

3) Construction

Weight: 50 kg.
Configuration: Polyhedron (26 faces), covered in solar cells.
Size: 400 mm (D) × 470 mm (H).

4) Analog

Transponder: Input frequency — 145.9-146 MHz (bandwidth 100-kHz); output frequency — 435.9-435.8 MHz.
Mode: J-mode.
Required uplink EIRP: 100 W.
Transponder EIRP: 2-W PEP.

5) Digital

Transponder: Input frequency — 145.9-146 MHz (bandwidth 100-kHz, 4 channels); output frequency — 435.91 MHz (1 channel).
Required uplink EIRP: 100 W.
Transponder EIRP: 1-W rms.
Signal format: 1200-baud psk, store and forward.

Monthly Listings

ASR (Amateur Satellite Report) is available for \$22 (\$30 overseas) for 26 issues (1 year) from Amateur Satellite Report, 221 Long Swamp Rd., Wolcott, CT 06716.

AMSAT Membership is available for \$24 per year (\$26 outside North America). Life Membership is \$600. Subscription to six issues of *Orbit* magazine each year is inseparable from membership. Write to or call AMSAT Hq., P.O. Box 27, Washington, DC 20044, tel. 301-589-6062. VISA/MC cards accepted.

ARRL members only send a 4 × 9-in s.a.s.e. with your call sign to ARRL for a complete, monthly orbit schedule for all operating Amateur Radio satellites. Please mark the s.a.s.e. with the month needed, to help us ensure that the envelopes are filled properly. A year's supply of s.a.s.e.'s may be sent in at one time, but be sure to affix 2 units of postage to each s.a.s.e.

The OSCARLOCATOR package second revision is now available for \$8.50 U.S., \$9.50 elsewhere. This package and *The Satellite Experimenter's Handbook* contain all the information you need to get started using the Amateur Radio satellites.

A free package of information about AMSAT and the Amateur Satellite Program is available from ARRL Hq. This package is intended for those with no knowledge of the program. □

*Satellite Program Manager, ARRL

Strays



QST congratulates...

the following radio amateurs on 60 years as an ARRL member:

- Edward J. Collins, W4MS, of Pensacola, Florida
- Herman G. Mustermann, W2TP, of Leonia, New Jersey

the following radio amateurs on receiving awards at the Dayton Hamvention:

- Dave Bell, W6AQ, Ham of the Year
- Lyle Johnson, WA7GXD, Technical Achievement
- Ethel Smith, K4LMB, Special Achievement
- Robert F. Zimmerman, W8ZM, DARA Distinguished Service

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee		Pending Dockets	Feb. 1984, p. 65
Members	March 1984, p. 60	QSL Bureaus	
Board Standing		Incoming	June 1984, p. 62
Committees (Minute 65)	May 1984, p. 60	Outgoing	March 1984, p. 65
Call Sign Assignment		QST Abbreviations List	Jan. 1984, p. 53
System	June 1983, p. 61	Reciprocal-Operating	
FCC Exam Schedule	Jan. 1984, p. 59	Countries	Nov. 1983, p. 71
License Renewal		Section Emergency	
Information	Jan. 1984, p. 51	Coordinators	Oct. 1983, p. 95
Major ARRL Operating		Third-Party-Traffic	
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— 1984	Jan. 1984, p. 52	U.S. Amateur Frequency	
MARS Information	April 1984, p. 86	and Mode Allocations	Jan. 1984, p. 51

Rules, 1984 ARRL UHF Contest

With the continuing success and popularity of grid squares as multipliers, they will again be used in this year's UHF Contest. This is a good opportunity to make a mega-jump toward earning the coveted VUCC award. If you have any questions about grid squares, consult January 1983 *QST*, page 49, for a thorough introduction. Rules are the same as last year. Be sure to mail your logs in a separate envelope from any other contest entries. Send an s.a.s.e. to ARRL Hq. and specify which contest summary sheet you need.

Rules

1) **Object:** To work as many amateur stations in as many $2^\circ \times 1^\circ$ grid squares as possible using authorized amateur frequencies above 220 MHz and all authorized modes of emission.

2) **Contest Period:** Begins 1800 UTC Saturday, Aug. 4 and ends at 1800 UTC Sunday, Aug. 5. Entrants may use as much of this time as they wish.

3) Categories:

(A) **Single operator:** One person performs all operating and logging functions, as well as equipment and antenna adjustments.

(1) Multiband.

(2) **Single band:** Single-band entries on 220, 432, 1296 MHz, and 2.3-GHz-and-up categories will be recognized both in *QST* score listings and by awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. See also Rule 8, (Awards).

(B) **Multioperator:** Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters.

4) **Exchange:** Grid-square locator (see Jan. 1983 *QST*, page 49). Example: W1AW in Newington, CT, would send FN31. Exchange of signal reports is optional.

5) Scoring:

(A) **QSO points:** Count three points for each complete 220- or 432-MHz QSO. Count six points for each complete 1296-MHz QSO. Count 12 points for each 2.3-GHz or higher QSO.

(B) **Multiplier:** The total number of different grid squares worked *per band*. Each $2^\circ \times 1^\circ$ grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: W1AW works W3CCX in FN20 on 220, 432 and 1296 MHz. This gives W1AW 12 QSO points (3 + 3 + 6) and also three grid-square multipliers. Final score is 12 QSO points \times 3 multipliers, or 36.

6) Miscellaneous:

(A) Stations may be worked only once per band for credit, regardless of mode. Crossband QSOs do not count.

(B) Partial QSOs do not count. Both calls, the full exchange, and acknowledgment must be sent and received.

(C) Fixed, portable or mobile operation under one call is permitted. Contacts with aeronautical stations do not count. A portable or mobile station may not be counted for more than one QSO

per band, even if the station is moving. However, a station that changes locations may be contacted for additional grid square multipliers, but not for QSO points.

(D) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC). The intent of this rule is to accommodate family members who share a rig, not to manufacture artificial contacts.

(E) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

(F) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (i.e., able to communicate over a distance of at least 1 km).

(G) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

(H) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(I) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (e.g., laser) and employing at least one stage of electronic detection on receive.

7) **Reporting:** Entries must be postmarked no later than September 5, 1984. Official forms are available for an s.a.s.e. from ARRL Hq., and all entrants are strongly urged to send early for a set.

8) Awards:

(A) Single operator

(1) Top-single operator score in each ARRL Division.

(2) Top single operator on each band (220, 432, 1296, and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if W3HQT has the highest single-operator multiband score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single op's, he will earn both a certificate for being the single-operator Division leader *and* an endorsement sticker for 432 MHz.

(B) Top multioperator score in each ARRL Division where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

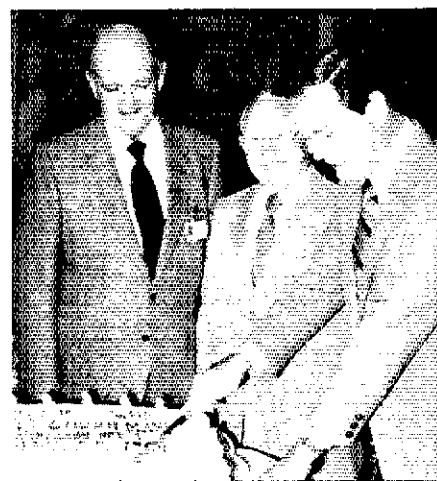
(C) Additional certificates may be awarded where significant effort or competition is evidenced.

9) **Disqualification:** See January 1984 *QST*, page 80.

Strays



Gary Johnston, WB4FAT, of the Northern Kentucky ARC, takes a break during the United Clothing Drive conducted by Goodwill Industries and the Boy Scouts of America in April. Working through the NKARC repeater, Gary and other club members helped coordinate the annual event. (WA4MOM photo)



In April, the Associated Radio Amateurs of Long Beach (California) celebrated their fifth anniversary of operation aboard the *RMS Queen Mary* with a spectacular party. Club President AK6Y (left) and Station Manager and Special Projects Chairman K6OSC watch the cutting of the cake by Joseph Prevratil, president of Wrather Port Properties, Ltd., operators of the *Queen Mary*.

I would like to get in touch with...

anyone who can help me find a 5BP1, 5BP4 or equivalent CRT for an Eico 425 oscilloscope. Ira Linderman, WB2RXX, P.O. Box 229, Commack, NY 11725.

anyone having a schematic diagram for a Gonset Model G-77 mobile transmitter or a Calico (Calif. Instruments Co.) Model 8000 digital voltmeter. W. Richmond, WD4CPQ, 521 Rawlins St., Louisville, KY 40217.

Results, Eleventh ARRL 10-meter Contest

By Edith Holsopple,* N1CZC and Bruce Hale,** KB1MW

This contest had the lowest solar flux levels since 1976. The JA and European paths suffered the most. Only a few JAs showed up here during the last 90 minutes or so on Sunday. European QSOs were limited largely to the Iberian Peninsula. The magnetic activity caused the mornings to be very sluggish — with only backscatter for the high-power operators to revel in. — WA5IYX

Despite the grumblings about "poor" propagation, the 10-Meter Contest was, as usual, a good time. It is a contest unique among contests. Although the spirit of competition is strong among the participants, cutthroat competition is not the driving force behind the popularity of this contest. Let's face it, 10-meters is a "fun" band. Compared with the average weekend on 28 MHz, this contest brings out a larger than usual number of stations to work. The casual operator doesn't feel out of place in the 10-Meter Contest looking to make a few QSOs or trying for the needed state/province or country to complete the requirements for an operating award such as WAS or DXCC. With the new point structure, a new Novice or Technician doesn't feel like an outsider. At eight points a QSO, they are a valuable contact to be sought out by both the casual operator and hard-core competitor.

To be competitive, one does not have to spend time in the 10-Meter Contest operating in a mode that is not to her or his liking. Choose your favorite mode (CW or phone) or go the mixed-mode route. Try your hand at keeping your QSO-per-hour rate high, or elect to scan the band, hunting for yet another multiplier to add to your totals. The 10-Meter Contest is basically what each individual operator wishes to make of it, and that's what makes this a fun contest for everyone.

The 1983 10-Meter Contest, held December 10-11, saw nowhere near the activity of the "big" contests of 1979-1982, when upwards of 1500 logs were received. It appears that there is a direct correlation between good propagation conditions during the contest and the number of entries received. With 1050 total entries (545 W/VE and 505 DX) received for the 1983 Contest, there is quite a difference when compared to the 1678 logs processed for its predecessor in 1982. Everyone likes to play when the playing is easy, but it is also fun to cast your line into a "dead" band to see what is biting. The drop in participation becomes apparent when we compare the 1983 and 1982 Top Ten Boxes. Even with the CW score change recommended by the ARRL



Harold, N9CQX, turned in the number 2 mixed-mode score in the Illinois Section.

Top Ten — W/VE

Mixed Mode		CW	
Call	Score	Call	Score
K3EST	605,814	N4AR	427,632
W5XZ	579,960	N5JJ	391,824
AA2Z	530,112	N4BP	345,200
W1WEF	502,488	K4VX	305,592
		(KM9P)	
NA5R	483,080	W9ZRX	245,216
(KN5H)		(WB9POH)	
N3DAY	430,500	W8FN	244,824
K8CX	420,856	KS1Y	243,200
WB7FDQ	288,860	K1VUT	197,104
KF4FN	288,464	K9BG	190,092
W0YK	252,500	WD4AHZ	149,260

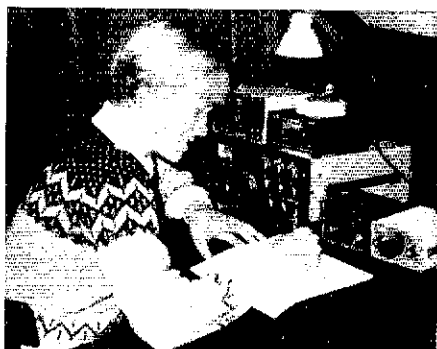
Phone		Multiop	
Call	Score	Call	Score
KG1E	364,686	W5VX	454,404
N4ZZ	302,788	K5LZO	423,832
K1NG	297,388	K3GM	374,934
(K11G)			
N5AU	266,240	W9LT	361,456
N2BJ	257,712	W2AZO	359,600
K8ZE	256,680	AA5B	348,636
KE5FI	251,658	K2XR	334,880
NU4Y	240,584	W0AIH/9	322,848
AC3T	230,400	ND0E	320,568
(KA3B)			
AI6V	219,666	KB4HF	320,128

Contest Advisory Committee (CW QSOs doubled in value from 2 points each to 4 points, with W/VE Novice/Technician QSOs worth 8 points each — a good move), the average score of stations in the Top Ten in 1983 is way down

Top Ten — DX

Mixed Mode		CW	
Call	Score	Call	Score
KD7P/KH2	504,672	LU8DQ	735,816
AM7CFW	422,620	HH2VP	551,816
HK3NBB	418,664	VP2MFL	470,400
		(K5BDX)	
VK2WU	378,774	ON4ABW	183,633
TU2NW	318,080	AM5CF	177,944
W9NXXD/HR2	290,274	EA6KZ	172,000
YV3BRF	230,724	PA0VDV	140,800
VP2KBZ	217,536	VK4XA	133,860
(VE3KZ)			
ZF2AG	208,754	EA2IA	132,440
(N8AG)			
JH7UU/JD1	205,280	CT1AIU	123,080

Phone		Multiop	
Call	Score	Call	Score
VP2EEW	833,136	NP4CC	655,844
(KU8E)			
FM7CD	542,064	XE1MDX	578,792
CT2FH	474,012	LU1E	529,314
(K1RZ)			
TG9GI	448,730	GW8GT	381,920
H18GB	377,080	LU1D	335,170
CE3DNP	366,620	G4MBC	322,560
LU1BR	331,782	W4JVN/KV4	273,152
HC1HC	316,778	LZ2KZA	261,500
EA8ZI	279,748	YV3IUP	192,124
GW4BLE	244,732	PI4DEC	189,600



Eddy, KA9OXI, provided those welcomed eight-point Novice QSOs from Illinois.

from the average scores in the same categories in the 1982 Contest. It appears that word about the change in scoring didn't get out in time. Quite a few contestors will find their scores adjusted to reflect this. We guess "punk" conditions will

*Communications Assistant, ARRL

**Contest Aide, ARRL

also have to shoulder some of the responsibility for this decline.

There were enough bright spots during the Contest weekend to make even the most competitive operator glad to participate despite those "hardships" mentioned above. There were some dandy country multipliers on, including TU2NW, 5B4XX, FO8GW and W6KG/HC8, among others. A little help for many looking to fatten their DXCC totals.

When we compare the 1982 and 1983 Contests, we notice that there are several operators that deserve special recognition for superb efforts. VK4XA again leads the pack on CW from Oceania. EA8ZI repeats as the top phone operator from Africa, while multiop stations XE1MDX and LU1E retain their titles as the stations to beat from North America and South America, respectively.

W/VE stations who distinguished themselves both in '82 and again this past contest include: W5XZ, who moved from number 4 on the W/VE Mixed Mode list to number 2 in 1983, and W0YK and WB7FDQ who also retained spots on the mixed-mode chart. On CW, N4AR went to the top of the W/VE heap from his number 2 showing in 1982. Phone operator KIIG at KING moved up five places from his 1982 finish in 1983 to take the number 3 slot. Carl, AI6V, remained in the top ten with a 10th-place 1983 finish. The operators of station W5VX can lay claim to the title of top W/VE multiop station in the 1983 contest. The gang at K5LZO also has reason to be proud as repeaters to the W/VE multiop top ten list. Good work!

A look at the log of K3EST, the top W/VE mixed-mode operator, shows us that of his 1594 QSOs, Bob worked 611 CW stations (3 Novices/Technicians) and 983 phone QSOs. Of his 137 multipliers, 79 were DXCC countries. Bob worked 48 states (missed Alaska and North Dakota) and 10 VE multipliers. Among the goodies he worked were C53, ZL/C, ST2, ZK1, ZS3, 5H3, 7X2 and 3D2.

Well, there it is — the 10-Meter Contest for 1983. Maybe it wasn't like the "big" contests of years past, but the fun and competition were there for those willing to invest the effort.

The 1984 ARRL 10-Meter Contest is scheduled for the weekend of December 8-9. Stop on by and join in on the fun.

SOAPBOX

The sunspot cycle drop-off was certainly noticeable, but there was plenty of action anyway (HK3NBB). Though propagation was very poor, it fortunately was compensated by a good Argentine barbecue and abundant cabernet sauvignon (LU1E). TVI during important weekend soccer matches caused a power reduction to 60-W and cut last year's score in half. Ah, woe (PP2ZDD). I used my MINIMUF program for the first time and the computer said "no condition," and it was true. Hope next year will be better (TG9GI). An electrical storm which hung over my QTH for some 9 hours on day 1 certainly didn't help my score. It dumped 5 inches of rain in one hour at one stage and hailstones as big as iceblocks. Luckily no antenna damage (VK2WU). Have you ever used an Armstrong rotator for turning a 13-MHz through 30-MHz log periodic? And the high winds didn't help (HL9RC/KA6KGS). The propagation was very bad (JA7YFH). I really enjoyed the test, even though I had to stop transmitting for cooking, having tea, moving manually the six-element antennas, etc. It was very hard, and I finished exhausted (AM7CFW). Ten meters is dead, viva 10 meters (EA4CFZ)! I lost my 10-meter antenna in a storm just before the contest. My 160 dipole and 40-meter beam just couldn't cut it (VE1YX). I only heard one European. If it weren't for the USA stations, I would have packed it up (VE4RP). Before the contest, lightning damaged both the linear amplifier and the rotor control box. As a result, the contest was operated using the TS-830S barefoot. Although I could

DX Continental Leaders

Continent	Mixed Mode	CW	Phone	Multiop
Africa	TU2NW	EA5YU/EA8	EA8ZI	—
Asia	JH7UJU/JD1	JF3HKY/9	RA9AKM	JA2YKA
Europe	AM7CFW	ON4ABW	CT2FH (K1RZ)	GW8GT
North America	W9NXX/HR2	HH2VP	VP2EEW (KU8E)	XE1MDX
Oceania	KD7P/KH2	VK4XA	N6CUQ/KH2	VK3DMU
South America	HK3NBB	LU8DQ	CE3DNP	LU1E

Division Leaders

Division	Mixed	CW	Phone	Multiop
Atlantic	N3DAY	K3WGA	AC3T	K3GM
Central	W9XT	W9ZRX	WB9FOL	W9LT
Dakota	K0/KX	KA0QAV/N	AC0/W	K0/SR
Delta	W5XZ	W5WG	N4ZZ	NR4S
Great Lakes	K8CX	N4AR	K8ZE	K8II
Hudson	AE2A	ND2K	N2BJ	W2AZO
Midwest	WA0/QMU	K4VX	KB0/PR	KM0/Q
New England	AA2Z	K81Y	KG1E	KB1U
Northwestern	WA7UQV	K7QQ	AG7M	ND7T
Pacific	N6NF	KS6H	A16V	K7SFN
Roanoke	K3EST	AA4VK	WD4BTF	K4YTZ
Rocky Mountain	W0YK	AC0S	WA7HQD	AA5B
Southeastern	KF4FN	N4BP	NU4Y	KB4HF
Southwestern	WB7FDQ	W7FGT	K6SVL	K6HAI
West Gulf	NA5R	N5JJ	N5AU	W5VX
Canadian	VE3CVX	VE6CHW	VE3CYX	VE7ZZZ



AM7CFW (EA7CFW), Jose, used a six-element monoband Yagi at 23 feet and a tribander at 27 feet to make the number 1 European mixed-mode score, which by the way was the number 2 DX mixed-mode score in this contest.



KA0QAV/N turned in the top CW score from the Dakota Division.

rotate the antenna, the indicator wasn't working and I had to look out the window to see where the antenna was pointing (ZS6WB). I don't have much of a problem understanding English, but it is difficult to listen to something like: "Knapsack One Xenophon Yerly Zenana, for K1XYZ" (F6HOY). I haven't had this much fun since Field Day, and I certainly didn't miss the bugs (KE4U). There was a lot of activity for a

"dead" band (WD5EWD). I lost most of Saturday because I had to do some last-minute Xmas shopping. I'll have to mark my calendar next year. Had fun (W1CNU). My results weren't too bad considering the conditions. The band was only open from about one hour after sunrise to one hour before sunset (N1ABY). Saturday night netted more signal reports from Minnesota than I thought there were hams from that state (KB1U). As I expected, propagation was down from the past few years, but there were lots of exotic multipliers this year (AF1T). I made up for things this year by splitting my time between SSB and CW, and I liked that arrangement very much (K1LPS). This was the real anniversary of the 10-Meter Contest ... one complete sunspot cycle (WB2AMU). Conditions were much better than I expected. I was glad to hear more activity on the Novice band (WA2SSH). I operated from the National Bureau of Standards ARC station. Conditions were excellent; the QRM sounded like 20 meters on a holiday weekend (N7IR). The most interesting part of the contest was working scatter on Friday night (KA3IKE and KA4FOO). The only thing that was missing was a QRP category. I must admit that I had a great time (WW4W). It was a great contest! Band conditions were weird. Backscatter was great on Saturday night, especially when VO2AG came through. I unexpectedly worked a JA (WD4BTF). I lost about three and one-half hours of good operating time on Sunday because of a power failure. The power was off for 19 hours. We now own a 600-W emergency power

WQ4H	69,012	311-	81-A	K8EBK	29,216	176-	58-A	OREGON		WA9MRU	7378	75-	31-A	K0TT (+ N8CBX)					
K4FPF	35,216	180-	62-A	KC7SF	21,720	392-	60-C			AD2H	1440	28-	18-A		75,360	942-	80-D		
KF4FP	18,836	125-	58-A	NM8L	9828	117-	42-C			K8BG	190,082	485-	93-B	MISSOURI					
N2DD1	10,140	99-	39-A							WD9DBC	62,140	237-	65-B	KABP	1632	35-	17-A		
W4OEL	105,276	281-	98-A	PACIFIC						N98J	5916	51-	29-B	K4VX (KM9P, opr.)					
K4OD	45,500	175-	65-B	AH8EK	11,544	114-	39-A			K8BOXI	4928	50-	22-B		305,592	744-	102-B		
N3OS	23,600	114-	50-B	KH8WT	32,400	179-	45-B			K9IKP	63,460	334-	95-C	K8RWL	61,360	226-	65-B		
K4JM	18,360	153-	80-B	KH8H	21,800	150-	36-B			WB9HAD	62,264	382-	86-C	K9HF	5700	56-	25-B		
WD4BTF	159,012	631-	126-C	KH8VK	72,174	523-	69-C			K9GZ	9890	115-	43-C	W80BX	2024	44-	23-C		
K4AF (N2DD1,opr.)				KH8CDO	12,792	164-	39-C			K89CTM	7310	85-	43-C	K8FA (+ WB0CQV, N8AQC, KABPGL, KA80IS)					
N4MM	34,310	235-	73-C	KH8J	884	26-	17-C			KA8LDS	7298	77-	47-C		92,988	564-	81-D		
N4GTU	18,120	151-	60-C	K9VVKH6	18	3-	3-C			KA8MOM	4098	64-	32-C	NEBRASKA					
K4QAX	6290	85-	37-C							K9GDL	1122	33-	17-C	KVBI	80,192	252-	72-A		
W4TMN	2132	82-	26-C	SACRAMENTO VALLEY						W9AA (N9AIB, W9CA, opr.)	45,738	225-	77-D	K8BYK	15,030	101-	45-A		
N3RC	234	13-	9-C	N6JM	27,540	75-	54-A	UTAH						WB8GOB	12,300	75-	41-B		
WB4ETD (+ WA4KAC, K1KOB)	67,830	570-	119-D	W8YMH	14,364	119-	42-A	WA7HQD	82,180	587-	7-C	W9RE	112,478	434-	91-A	W8SSC	94,802	443-	107-C
				WABBRV	9424	85-	38-A	WASHINGTON											
5				WD8CQH	300	24-	13-B			W9XD	23,858	124-	56-A	NORTH DAKOTA					
ARKANSAS				A16V	219,666	1181-	83-C			W9TC	13,068	105-	54-A	WB8BNR (+ N8AEY, KA8LAY)					
W5EIJ	24,780	150-	59-A	N6WR	7524	99-	36-C			WD9EME	12,508	115-	53-A		11,136	101-	48-D		
LOUISIANA				SAN DIEGO						N4FKF	378	20-	7-A	SOUTH DAKOTA					
W4XZ	579,960	1437-	135-A	N6ND	68,084	763-	87-A			W9ZRX (WB8POH, opr.)									
N5AMA	21,228	174-	61-A	W8ZT	58,484	219-	63-B			N9NC	95,420	367-	65-B	WA3PWL0	16,832	124-	51-A		
W5WG	44,352	163-	65-B	AA8EE	20,486	122-	42-B			WB9CIF	11,224	121-	46-B	WD8CXU	15,360	153-	48-A		
KA5QMO	13,684	112-	28-B	KF6BB	31,008	277-	57-C			KA9ORN	350	13-	7-B	VE					
KARDLM (+ K0SRW, KA5BO0)	36,890	215-	83-D	N6JMV	5928	78-	38-C			N9NB	184	48-	29-B	NEWFOUNDLAND					
				K6HAI (+ KF6KE, W6JXA, KW6V, WB8LLO, WB8BDY, N6AFT)	66,432	375-	64-D			WB9FOL	144,890	689-	105-C	VO1AW	12,972	99-	47-A		
				SAN JOAQUIN VALLEY						K89CO	45,748	257-	89-C	MARITIMES					
				W6SX	4	1-	1-B			W9NZW	37,410	215-	87-C	VE1YX	13,356	126-	53-C		
				KA6BIM	108,176	672-	79-C			K9JDF	13,912	189-	37-C	QUEBEC					
				WB8WEW	24,360	210-	58-C			W8LT (+ KR9U, KR9V)				VE2YM	29,944	174-	76-A		
				WA6SLF	8658	117-	37-C			N9SF (+ WB96 AMI, C1F, I1V, W8BJKL, K9LMK, N88 ACD, DRM, AB8D)				VE2QD	14,210	103-	49-B		
				WB8LBR (+ loggr)	39,388	266-	74-D				36,716	274-	67-D	VE2QO	10,664	76-	31-B		
				SAN FRANCISCO						N9BUC (+ WB9AAL, N9CUL, KC9FO)				VE2DT	14,148	131-	54-C		
				K6JFY	8,400	100-	46-B			WISCONSIN				ONTARIO					
				WA8LLY	4400	50-	20-B			W9XT	199,308	673-	102-A	VE3CVX	232,410	914-	127-A		
				K6AYB	3770	65-	29-B			W9OP	135,860	644-	105-A	VE3AXV	60,496	289-	76-A		
				SANTA BARBARA						K9XKF	72,616	304-	82-A	VE2AEJ3	37,680	155-	60-B		
				WA8FGV	69,136	453-	58-A			N9KS	12,584	104-	44-A	VE3NB	30,600	147-	51-B		
				N6TR	46,308	351-	51-A			W9WAQ	122,144	340-	88-B	VE2WA/3	19,456	150-	64-B		
				KW6H	11,440	111-	40-A			N9DSK	42,768	198-	54-B	VE3LJW	18,532	109-	41-B		
				KC7S	7336	56-	28-A			KW9O	13,464	97-	33-B	VE3CYX	198,800	800-	123-C		
				AA4Q	4116	49-	21-B			W9HE	6480	54-	30-B	VE3FEA	6936	102-	34-C		
				SANTA CLARA VALLEY						K9GDF	1792	29-	16-B	MANITOBA					
				N6NF	169,200	896-	72-A			W9AIIW (+ K9WVF, WA8RBW, W8UC)				VE4ALO	12,000	105-	50-A		
				N6HR	42,944	200-	61-A				322,848	983-	118-D	VE4EAX	14,268	89-	41-B		
				KE8PQ	32,148	208-	47-A			6				VE4EP	12,000	120-	50-C		
				N6UW	31,900	200-	55-A			COLORADO				ALBERTA					
				N6YE	12,152	95-	3-B			W9YK	252,500	982-	101-A	VERCCL	9680	177-	30-A		
				WA8HAD	468	13-	9-B			W9JF	10,218	86-	39-A	VERCHW	57,428	285-	49-B		
				W6YVK	13,818	147-	47-C			W9DK (KR0U, opr.)				VE6AGV	19,088	227-	42-C		
				N9BX	9778	94-	52-C			AC08	2944	44-	23-A	VE6CHS	6580	94-	35-C		
				K3QM	4382	64-	34-C			K10J	49,720	225-	55-B	BRITISH COLUMBIA					
				SANTA CLARA VALLEY						K8OST	9856	65-	34-B	VE7DVG	12,284	332-	37-B		
				N6NF	169,200	896-	72-A			W9BUCJ	264	11-	6-B	VE7FV	33,040	295-	56-C		
				N6HR	42,944	200-	61-A			K8UK	37,128	273-	68-C	VE7EK	8504	99-	48-C		
				KE8PQ	32,148	208-	47-A			W9BZ	34,572	258-	67-C	VE7ZZZ (VE7ENF, VE7EMX, VE7EPN, oprs)					
				N6UW	31,900	200-	55-A			N9DE (+ W8KEA, K9MWM)				VE7GFX (+ VE7GWS)					
				N6YE	12,152	95-	3-B				320,568	1036-	111-D	VE7GWS	33,220	302-	55-D		
				WA8HAD	468	13-	9-B			OHIO				CHECKLOGS					
				W6YVK	13,818	147-	47-C			K8CX	420,856	1081-	124-A	AK2H,EA1CFJ,EA5DPZ,EA7AKN, F6CQI,G2AJB, HA1UJ,HA3KNA, HA8ZC,HG5VZ,H13AMF,J1EARQ, KB6AXH,T,KF6OP,K1JN,KL7XO, KQ1U,LA1KQ,LA1NRK,LUTJ1, L21GD,L21IA,N1BYO,N2BXY, NL845R33,QH1TD,O,H2BFG, QH8RC,OK1AD,OK1K2W,OK1US, QZ1ACB,OZ1UEO,QZ1FGS, PA3BDK,PA3SZV,PA3CF,PA3GNY, PY1QO,PY1RN,PY2AG,PY2JAG, PY3XZ/P2,RA1ASK,RA3DAD, RA3DDU,RA3DDW,RA8CQW, SML2WU,SM4DL,S,SM5AWR, SM6A1,M,SP6C1K,SP9AKD, SV8AA,UA3EFP,UA6FOH,UA3AGW, UA3DU,UA3DU,UA3JDX,UA3JTES, UA3TGO,UA3XBB,UA4CO,UA4LR, UA4WB,UA4YA,UA4AZ,UA5A3J, UA6APP,UA6PCE,UA6PKM, UA9FKZ,UA9OAY,UA9SFR, UA9XCP,UB5AAL,UB5ABY, UB5OC,UB5LIE,UB5MNO, UB5UQ,UB5HAB,UB5M8D, VE6CQA,VE6JG,W2LFW,W5EIJ, W9YCV,Y21CFJA,Y22HF,Y22OB, Y24SKG,Y26HOP,Y26SO,Y30ACF, Y38BYN,Y38CQD,Y38CT1, Y38RM,Y35TE,Y38YF,Y44RC,Y5ZL, Y84YH,Y87XL,Y02BZV,Y08DBL, ZL40YVC					

Two Meters Saves Lives in South Carolina

Bernard Palmer, meteorologist-in-charge of the National Weather Service airport office at Columbia, South Carolina, had been tracking a severe-weather system crossing the state on March 28. Already he had reports of tornado damage at Newberry, 40 miles to the northwest, and at Winnsboro, 25 miles to the north, but nothing more during the half hour or so since then. As seen on radar, the storm was still very active; in fact, it seemed to be intensifying. Barometric pressure was unusually low, below 29 inches, reaching levels ordinarily found only in major hurricanes. He could look out the window and see hailstones melting, and had received reports of larger hail, golf-ball sized, in the city of Columbia itself, where it had dented auto bodies and had broken windows. The storm was moving rapidly, about 50 miles per hour.

Should he issue a tornado warning? The odds were certainly heavily in favor of a tornado in the storm system, but the only instrument that can detect a tornado with full reliability is the human eye, and the storm had been moving across an area from which he could accept few, if any, reports. Weather Service policy is to issue no warnings until there is certitude, for fear that warnings of nonexistent storms might cause the public to ignore later warnings of real storms.

At 6:58, Palmer's unlisted phone rang. The caller identified himself as Jack Pegues, KA4ABW, ARRL Emergency Coordinator for Chesterfield County, operating mobile at Cash, South Carolina, and calling him via phonepatch through the Cheraw repeater. Jack said he was looking at damage that appeared to have been caused by a tornado. Palmer asked a few questions to confirm that it indeed had been a tornado, then issued a tornado warning at 7:01 P.M. for Marlboro County and the towns of Bennettsville, Tatum and McColl. At 7:15 the storm struck Bennettsville and roared its way through Tatum and McColl, and then into North Carolina, leaving death and devastation in its wake — flattened shopping centers, uprooted trees, destroyed homes, autos and mobile homes carried away. There seems little doubt that the 14-minute warning saved lives.

Once the warning had been given, the Weather Service's responsibility had ended. Palmer continued to follow the storm into North Carolina and on up the Eastern Seaboard, where the following day it was to strike the Northeast as the worst blizzard of the year. But the work of the amateurs had only begun.

Jimmy Walker, WD4HLZ, ARRL Section Manager for South Carolina, listed five phases of Amateur Radio's assistance in this emergency. The first, aiding the Weather Service, was now complete. But the other four would continue for several days, in some cases for as long as two



The quick response of ARES operators, such as Ernest Smith, KA4NIW, alerted residents of Bennettsville, South Carolina, of an approaching tornado and helped avert a greater loss of life. Amateurs provided communications throughout the relief effort as well. (KB4GJH photo)

weeks: rescue operations, local government communications, shelter operations, health-and-welfare traffic. Rescue operations were substantially completed the following day, and the other functions were phased out as normal communications were restored. The large number of amateurs on hand and the well-developed system of 2-meter nets and repeaters in the state made it possible to attend to all these functions as needed without neglecting any.

Over 350 amateurs are known to have been involved in one capacity or another; it would be impossible to list them all in the space available. And even if it were attempted, many would be omitted: the amateurs who monitored the nets in case any traffic that they could handle should be listed, but who never touched the key or mike button out of the respect for the principle of staying off the air in an emergency unless you can help. And the amateurs who handled the health-and-welfare traffic through the ARRL National Traffic System and through independent nets all over the country deserve credit for the success of the operation, too, not only those at the scene who did the originating and delivering.

Because the Weather Service had been warning of severe weather all day, amateurs had activated their weather-watch nets. When the storm struck, they were already up and running. Before 8 P.M., only minutes after the storm had passed, they were on the scene to evaluate it and to reestablish communications. Their evaluation: The pictures that appeared in the papers and on TV did not begin to do justice to the devastation caused by the storm, which in some places leveled everything in a mile-and-a-half-wide swath. But there was no time for sightseeing; communications were needed immediately, and local officials were paralyzed without them, stunned by the magnitude of the problem and by its suddenness, and not knowing where to begin. Once officials realized that communications via Amateur Radio were for real, and that

they could be used to coordinate their operations, rescue work began in earnest.

In charge of the operation was Jack Pegues, KA4ABW, whose timely report to the Weather Service had triggered the tornado warning. Jack acted as the right arm of Capt. John Driscoll of the Bennettsville Rescue Squad during rescue operations at the Bennettsville Shopping Center the night of the storm, and continued to coordinate communications for the next six days.

Haywood Furman, N4CBQ, ARRL Emergency Coordinator of Marlboro County set up first at city hall, but later went to the hospital to provide communications with the rescue command center at the shopping mall, to assist in transporting the 200 and more persons who had been injured.

Jeff McElroy, KA4BGX, and his friend Robert Fowler heard of the storm in Columbia, where they attend the University of South Carolina. They set out at once for their hometown of Bennettsville, arriving about 1 A.M. They did not know of the other amateurs on the scene, but they knew communications were needed. Jeff found his home destroyed, but they were able to set up a station in the Fowler Pharmacy and get on the air around 3 A.M., with both HF and VHF capability. They proved to be a vital link for health-and-welfare traffic. People soon learned they could contact relatives; Jeff was able to report that he and Robert were successful in locating almost all the people for whom they had received inquiries.

On the night of the disaster, Ernest Smith, KA4NIW, provided the only communication from Lester, South Carolina, despite the fact that among the dead in Lester were three members of his wife's family. Ernest provided communication for shelters throughout the emergency, only taking time out to attend the funeral.

More than 40 amateurs moved into the disaster area to render assistance, bringing their own equipment. There were 200 more in reserve who had offered to come if additional help should be needed. Most traffic was handled by 2 meters into, out of and within the disaster area itself. All concerned agreed that this was the best way to do it, relieving some of the pressure from the disaster area stations, who could leave the problems of forwarding the traffic on HF to others outside the area. The South Carolina Noontime Net on 7250 (Barbara Mattson, KA4UIV, manager) and the South Carolina Single Sideband Net on 3915 (Emmy Patience, KA4LRM, manager) remained in session for long periods during this time, with 50 or more stations checking in and traffic totals reaching 600. Health-and-welfare traffic into and out of the state was handled without difficulty by the Carolinas Net on 3567 or by direct liaison to the Fourth Region Net.

Agencies served include rescue squads, police, hospitals, ambulance services, the Red Cross and church groups. Amateurs provided a phonepatch

*Deputy Communications Manager, ARRL

from the Reverend Harrison Lamplry, a minister in McColl, to Cliff Satterwhite in Columbia, the first contact to the outside from McColl, which brought a church group from Alabama to assist in the relief work. This group, among other things, served thousands of meals during the next 10 days to storm victims, rescuers, Red Cross personnel, National Guardsmen, amateurs and other church workers. Cliff said, "We were able to move one day sooner because of the call by Amateur Radio, and the group from Alabama had an impressive number of radio amateurs among its members, too. One even flew in from Mississippi to help." Since the storm, the various churches in South Carolina have taken steps to form a statewide interfaith council to prepare for similar emergencies in the future. Amateur Radio will certainly figure in the plans.

In short, it was a textbook performance — almost. There were a few problems. There were amateurs who resented emergency traffic that interfered with their ragchewing. There were a few amateurs helping who were not familiar with net procedure and with proper message form. In particular, some failed to inform net control on leaving the net, something that could be serious during rescue work when rapid communication can be a matter of life and death. And some messages were sent out without proper signatures to authenticate the message. We provide the communication, the officials provide the traffic, and we are responsible for what is said. In this instance, there proved to be only minor problems. Nearly everybody performed in a way that showed Amateur Radio in its best light, and showed the value of the drills and exercises and of regular participation in the nets over the years. All in all, it was a most efficiently run operation, but none of those involved will be looking forward to doing it again. — *Chuck Clark, K4ZN, Moncks Corner, South Carolina*

CALIFORNIA CITY OFFICIALLY RECOGNIZES ARES

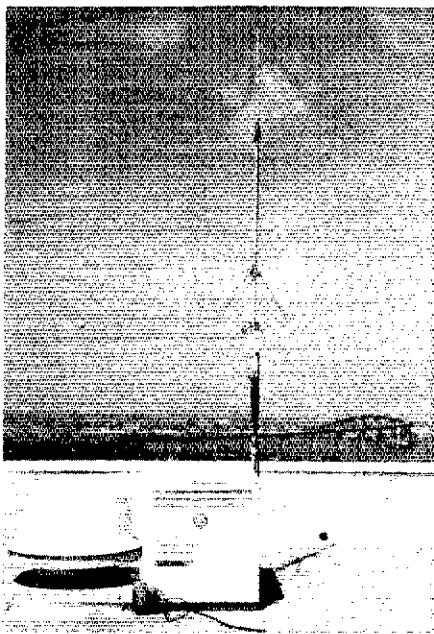
The city of Coronado, California, a seaside resort city of 20,000 (plus 33,000 U.S. Navy personnel assigned to three bases in the city, and several million visitors who come each year), maintains through the Police Department Emergency Preparedness Unit a very active ARES program. Over 40 amateurs are directly involved with our ARES program, and provide communications support to all departments of city government, the school district, hospital, Red Cross and U.S. Navy Amphibious Base during emergencies. In addition to disaster/emergency communications, our ARES group assists in a number of special events and displays throughout the year.

The city maintains a 2-meter repeater (WA6CUP/R) on 147.180 MHz (up 600) to support the ARES program. The repeater is located atop the tallest building in the area, a 12-story condominium 100 yards from the Pacific Ocean and only 500 yards from San Diego Bay. The repeater provides coverage of our peninsula city, south San Diego, city and county and even into Mexico. The repeater has both auxiliary ac power as well as dc battery backup. Solar power is in the process of being added. The repeater is autopatch equipped.

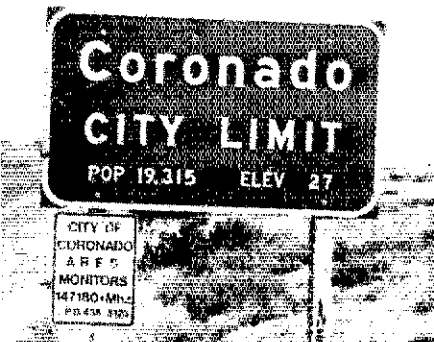
Should QST readers visit the greater San Diego area, they are more than welcome to use our open repeater. To call our ARES program to the attention of the thousands of amateurs who visit our city each year, the city has erected signs at each entrance to the city. — *Jerry Boyd, WA6CUP, PIO, San Diego Section*

HAMS HELP ACROSS THE BORDER

The 1984 International Friendship 26 Mile Marathon Run was held on May 6, 1984. Amateur Radio operators in both Southern California and Mexico teamed together to make this annual event a real success. Race organizers and officials on both sides of the border were impressed with the efficiency and effectiveness of the many hams who participated. Slightly



WA6CUP/R, operated by the Coronado Police Department ARES group, covers south San Diego County and northern Mexico. San Diego-Coronado Bay Bridge and San Diego are visible in the background.



Signs calling attention to the Coronado, California, ARES Program and repeater are posted at entrances to the city.

less than a third of the run occurred on American soil, beginning in Chula Vista, California. The runners crossed into Mexico at Border Field State Park, where Mexican amateurs took over race- and safety-related communications. The winner of this race, in which thousands participated, covered the distance in 2 hours 34 minutes and 13 seconds, excellent time when the hilly terrain over the Mexican portion of the course is considered.

U.S. amateurs participating were WD6CSS, KM6I, W6YVY, K6QM, KF6BB and K6DBJ. The Mexican amateur contingent consisted of XE2BC, XE2BW, XE2NI, XE2ALC, XE2AFS and XE2SI.

This event served not only as excellent training for the ARES member participants, but international amateur relationships were greatly enhanced when all participants enjoyed a "Fiesta" at the finish line in Rosarita Beach, Mexico. — *Jerry Boyd, WA6CUP, PIO, San Diego Section*

FIFTY-FOUR YEARS OF STATE FAIR TRAFFIC

The Tampa Amateur Radio Club has a permanent booth at the new Florida State Fair grounds, where every February we gear up for about 5000 messages. The National Traffic System knows we are there. For 12 days, messages are taken at the counter; some go to the club house. Many are punched RTTY tape in

the booth. Many of the same people show every year with their address books and write out bunches of messages. Gordon Callender, WB4RHY, has managed the booth for many years with good help from members and friends who get the work out. The 2-meter communication is accomplished with 180 feet of coax to a permanently mounted J-Pole antenna outside the building.

Tampa ARC has a permanent club house, a building leased from the city, formerly used as a brig by the Coast Guard in WW II. W4DUG has the capability of operating two HF stations on RTTY, CW and SSB with antennas for 15-80 meters. It is 7.2 miles from the fair grounds, so 2-meter simplex on 147.525 with the J-Pole antenna provides adequate communication.

Frank Ziegler, K4EUK, is the chief operator at the club house. He sets up the operating schedules on HF, lines up the operators for phone, CW and RTTY, and begs for all the help he can get for punching RTTY tape. Five-thousand messages equals 416 per day, and 80-90 percent go out on RTTY.

The RTTY traffic goes to Al and Mae Burke, W3VR and W3CUL, who have their circuits into the National Traffic System. Al and Mae used to be in Pennsylvania, a long-haul circuit, but are now located about 20 miles across the bay, in Largo. Stan, VE3BSY, and Phil, WF4X, take phone traffic daily. Cy, W4DVO, Harris, WA4JDH, and Larry, KR4X, take CW traffic. And the Florida Mid-Day net catches a fair share of the traffic. Three RTTY tape punches at the club house, plus the one at the fair grounds, operate daily with the club house open in the evenings for those who can't come during the day.

When does the computer come into the picture? RTTY goes out at 100 WPM, which can be improved on, but the big job is typing, whether into a computer or on tape. When the receiving stations have ASCII capabilities and the club can transmit ASCII, the traffic can be moved faster. The computer is coming to the club some day, I'm sure.

The Tampa ARC, started in 1922, is 62 years old. The club was incorporated in 1935. The state fair traffic started in 1927, with time off for WW II. Until 1975, traffic was sent from the old fair grounds. Heavy rack-mounted gear was moved in and out every year for the fair.

The club extends many thanks to those traffic handlers who get our messages through. Less than 2 percent are serviced back. One reason for service messages is wrong phone numbers, so verifying the phone numbers helps the originator.

Our thanks to the many dedicated amateurs for all their help. — *Everett Z. Randal, NJ4O*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

□ For April, 35 SEC reports were received, denoting a total ARES membership of 19,241. Sections reporting were: AB, AZ, CO, CT, ENY, EPA, IN, KS, ME, MI, MN, MO, MS, NE, NEL, NTX, OH, OK, ON, PAC, SV, SDG, SF, SJV, SD, SFL, TN, VA, WA, WV, WM, WNY, WPA and WI.

NATIONAL TRAFFIC SYSTEM

TEN/c2 certificates went to KC0AF, K0IPT, W0HTP and WB0LTV. RN6/c4 certificates were awarded to WA6KRA and WB6DOB.

April Reports

Cycle Two

Area Nets

1	2	3	4	5	6	7
EAN	30	1124	37.5	.777	93.3	
CAN	30	1159	38.6	.736	100.0	
PAN*	60	806	13.4	.467	99.4	

Region Nets

1RN	57	518	9.1	.379	86.1	100.0
2RN	53	383	7.2	.349	71.3	100.0
3RN	30	237	7.9	.421	89.8	100.0
4RN	60	987	16.5	.567	76.4	100.0
RN5	60	944	15.7	.522	98.3	100.0
RN6	60	584	9.7	.368	96.7	100.0
RN7	60	536	8.9	.448	86.7	100.0
8RN	59	453	7.7	.378	93.3	96.7
9RN	56	493	8.8	.368	93.3	100.0
TEN	60	802	13.4	.542	76.5	100.0
ECN						83.3
TWN	57	256	4.5	.255	75.3	98.3

TCC

TCC Eastern
TCC Central
TCC Pacific

781 520
99 505

Cycle Four

Area Nets

EAN 30 1799 60.0 1.458 98.1
CAN 30 1054 35.1 1.101 100.0
PAN 30 1161 38.7 1.075 98.1

Region Nets

1RN 93.3
2RN 90 584 6.5 .472 91.0 86.7
3RN 61 298 4.9 .508 95.6 100.0
4RN 100.0
RN5 100.0
RN6 60 763 12.7 .661 98.8 98.3
RN7 90 695 11.6 .882 97.4 100.0
RN8 80 458 7.6 .430 97.0 100.0
RN9 80 527 8.8 .581 99.2 100.0
TEN 80 447 7.4 .426 83.7 100.0
ECN
TWN 53 322 5.1 .444 82.7 90.0

TCC

TCC Eastern
TCC Central
TCC Pacific
Sections
Summary
Record

481 349
105 775
6782 27419 4.0
8108 46,958 5.8
9642 56,155 19.1

* PAN operates both cycles one and two.
TCC functions not counted as net sessions.
Section and local nets reporting (248): APSN ATN (AB), AENR AENR AENX AENY AENZ ATNM WAEN (AL), ATEN HARC (AZ), SWN (AZ/NA), BCEN (BC), NCON NCTN RTTYV SCN SCNV (CA), DEPND DTN SEN (DE), BEN CFRN DEN ENMC FAST FMSN FMTN FPON FPN DTN GCVTN GN LCEN LSTTN NFPN PBTN PPFN PRVAN QFN QFN6 SEFTN SPARC SVTN SWFTN TPTN (FL), GCN G8BN GSN GTN WGA (GA), I7SEN I75MN ICN ITEN TLCN (IA), ILN ISN ITN (IL), ICN IRN ITN QIN (IN), 3ARES 4ARES 7ARES 11ARES BARES CARN KNTN KTN KYN KYPN MKPN NKARC STMTN WTEK (KY), LTN (LA), AEN CMEN MPSN PTN RACES SGN (ME), CITN EM2MN EMRI EMRPN EMRIS HHTN NEEPN RIEM2MTN WMEN WMFN WMN WMTN (MA/RI), MEPN MMN MTN (MB), MACS MITN MNN QMN UPN (MI), MNAMWXNT MSN MSPN PAWN (MN), CARL CMEN IFN JCCD LAAN LO2FM MEOW MON MOSSB MTTN PH RRARN (MO), MTN (MS), BSN MSN MTN (MT), CEN CMN CNETN PCTN RAR (NC), CN CSN (NC/SC), BRARES BVARES CC2MN EN2MN MARES MNARES NCHN NE40 NE75 NCW NMPN NNN NSN PARC SBARES WNN (NE), GSFN (NH), HCATEN JSARS NJM NJPN NJVN OBTN SJVN TQETN (NJ), NSN (NV), BAVTN CDN CNYTN EPN HVN NCVHFTN NLI NLPIN NYPN NYS NYS/M SCVHFTN SDN WDN (NY), ALERT BN BNR BRTN BSSN COARES HCARES LCNWARES MCTN NCTW NEON O6MN OSN OSSN (OH), CARA OLZ ONON OPEN OTWN OCWA-83 STN (OK), KTN OLN OPN OSN OSND TIN (ON), OHNN ORARES OSN PTTN SOFM THN (OR), D5SEN (PA), PTN (PA), QSN (PO), GPD2MN LC2MN SCNTN SCSSBN (SC), BHN SDEEN SDN SDSMN SDTIN WCEN (SD), TNCN TNPN TNVN T8RN (TN), DFW NET TEX TSN TTN (TX), BUN DCSEN UCN (UT), STARES SVEN VLN V SBN VSN VTN (VA), EWTN NTN NWSSBN PLS WARTS WSN (WA), WINB WINS (WI), WYARN WYFN WYV WYVN (WV).

1 - NET 4 - AVERAGE 7 - % REP.
2 - SESSIONS 5 - RATE TO AREA NET
3 - TRAFFIC 6 - % REP.

Transcontinental Corps

Welcome and congratulations to KA1GBS, who is the new director for TCC-EIC2. Marcia is also the GTM for the ARRL Eastern Massachusetts Section. TCC-CIC2 certificates were sent out to WA4JL, WA4JTE, WF4X, N5BT, W5CJT, N5DFO, K5KJN, W5KLV, WB5OXE, KB5UL, K5UPN, WB5YDD, KW9J, W9JUU, WB9NVN and W9FRC.

Cycle Two

TCC Eastern
TCC Central
TCC Pacific
Summary

90 86.7 1089 520

Cycle Four

TCC Eastern
TCC Central
TCC Pacific
Summary

1 - AREA 4 - TRAFFIC
2 - FUNCTIONS 5 - OUT-OF-NET TRAFFIC
3 - % SUCCESSFUL

TCC Roster

The TCC Roster (April) - Cycle Two - Eastern Area (KA1GBS, Director) - AA4AT N1BHH WB1BYR N3COY WB2EAG K1EIC KA1GBS VE3GOL WB3GZU KO2H KB2HM VE3HTL K4JST WD8LRT W2MTA K8OZ

WB8PMJ WB8QHB W1QYY WD8RHU K3RZR KA1T KB3UD KR4V AK1W N2XJ W1XX WB8YDZ. Central Area (N5AMK, Director) - N5AMH N5AMK N5BT W5CJT N5DFO KA0EPY W9FRC NG5G KW9J WA4JL WA4JTE W9JUU K5KJN W5KLV KD5KQ WB9NVN WB5OXE KD5RC K5UPN KV5W WF4X WB5YDD. Pacific Area (WB8XB, Director) - KT6A N7CSP N0CXI KU6D W0EJD WD5E5V KB7FE W7GHT N6GIV W0HXB W5JOV KR7L KB0MB K6OWA KF7R ND5T NV8T W7TGU K8UYK KO7V WB7WOW K8YBV. Cycle Four - Eastern Area (W2CS, Director) - AA4AT VE3AWE K1BA W3BBN K13C WA4CCK N3COY W2CS N8CW KA3DTE WB2EAG W1EFW W2FR WD4FTK KA1GBS W2GKZ VE3GOL WB3GZU KB2HM WB9JHH W1SIO K4JST KN1K N4KB AH2M W2MTA W1NJM WB4PNY W3PQ W8QHB W1QYY W2RQ K3RZR KA1T KB3UD WB4UHC W4UQ W2VY VE1WF W2XD N2XJ W1XX N8XX WB8YDZ K4ZK W2ZOJ. Central Area (K5GM, Director) - W0AM W5CXY K0EZ W5GHP K5GM W0HI K5OAF W5RB N5TC W5TFB K5TL W9UUY KB9X KV5X. Pacific Area (KN7B, Director) - A0DA K88N KA7CPT KC0D W7DZK N08BM W8EOT W7EP W7GHT K7HLR N2IC W61NH W5JOV W7LG W7LYA W87NHR W00GH ND5T WA7TEH W5UH W7V8E W6VZT KM7Z VE7ZK.

Public Service Honor Roll April 1984

This listing is available to amateurs whose public service performance during the month indicated qualifies for 80 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS CW nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points max.; (9) Participating in a public service event, 5 points each, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations listed in the Public Service Honor Roll for 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

229 WD8LDY WB2IDS W2AET
K7VW 110 WB2VUK K4IWW
221 KA8GJV WX4I W2VY
N8ACW WB0TED 97 87
207 108 AA4AT W0IKT
WB7WOW W9JUU K8YD 86
153 WD8RHU KA5HTD 86
K4SCL W6VOM K11M KF4U
148 W9JUU W7JMH 118GW W2BIW
KA3DLY 107 AK1W 85
148 K4KDJ WB4WII KA5QWM
WX4J KB4WT KT9I N1ARI
140 W61NH N3COY WA1YNZ
KB0Z WA4QXT W8ZCM WB5NCM
132 WB2MCO 95 84
WB2EAG W1E0F KD2BE N08EM
130 KZ8Q WA0TFC N9EEM
WF4Y W1E0F 94 W3WVM
128 K2VX W8QHB
KD7ME N16A WA6ZUD W9DMM
WB20WO K7GXZ W6NTN
127 104 KA2BHR WB5YDD
AF3S W0CYH KA7GQP 83
KA1KML W1KK K08AF N8EVC
W1PUO WA4JDH N1CPX KA8BNW
125 WB1GXZ W5C7H WB2GHN
KA0EPY W9QHB W04TZR NV8T
KA1EXJ 103 93
KR4V K2GCE 82
124 WB1HII K3HO KB2HM
KW9J 102 K8AGD KFBJ
123 KA8ARP KA4SAA 81
KA1GBS KB3UD K3JL KT6A
WB4WYV KC2QQ K3JL N8CFS
121 KC2TF NG4J WB4HRR
WA2FJJ K55V WA2NKC VE2EDO
119 W1RWG 91 WA7MEL
KM9B W2PUE 80
KS7I W8BK K8UYK K2ZM
KM9B WA4CCK K80CB KD5FR
WB4PFK WA4PFK KB7FE N5TC
117 WD4ALY 101 N2AKZ 79
WD8LRT 101 N6AWH 78
115 KA4GUS 90 78
AL7W KABNCR 90 78
WF4X KB4OZ K4VWK K1JHC
114 KK1E K8KJ K8JDI
K4JST W2MTA W4CCK K01K
KA4BCM W4ANK W5KLV
KT0U WB2IKL W7LG W5KLV
N4GHI 100 89 WD4HBP
113 W7GHT 77
KA8CPS WB2KLF N1BJW K2ZVI
W7VSE WB4YQP VE3DPO ND2S
99 WA4LXP W9XK
N4PL WB2RBA W9NXG
N2XJ 88 76
111 98 KA1T KA5AZK
K07V WA2JBO KT6D VE3GT

75 KA5LQA N5DFO W2FR
KA1EPO N5BT W8GUP WA3UNX
KA8PQH W4HON WB8GM WA4JTE
KP4DJ W4LXB 64 WB7WVD
N1AJJ W88MIO 64 A18E
N7BGW 69 KA4SKV WA4RNP
WB1GLH K1CB KX7T 60
74 WB7OEX W1TN K7OVK
KA2DQA W22OJ W22OJ W2BSC W81OH
KA9EWN W8BSIW WB4AID W81OH
K6APV VE3KK 63 W88SCP
KB4L WB1ABQ WB9NHV W88EGK
WB6QBZ WB2OMZ KF7R W91OH
KD9K WD4BSC 62 58
VE2FMQ 67 AK2E KA4YHSJ
73 KD8DY KA1EKQ KA8JKT
K2YQK KR7L N2DZZ KA2OPGT
K08JM K4ZN WA1DXT 47
WB6DOB N5EZM WA8DHB N5FDLT
KG2D VE3GOL WD4OCW 45
KL7JG W3DKX WD4PBF WB1BCPN
VE3BDM WB2QIX WB2EIB WB2ANKT
N6CVF 61 44
WA4EYU KA1GWE K2GXT KA2TOGT
WB8MTD KA8BAAJ KA8OCT KA8JJKT
WB8UUD N2BPB KB4GPN 43
72 WD4KBW KC800 KA1HPOIT
W7LNE 85 KC2YZ 42
71 85 N3CW W1JRA KA1IEKN
WA2KOJ KA1EGE N3CW N2EQMT
KA2QIK W4FMZ NF2G N2EQMT
KA7AID KA7AID W1JRA N5GKPT

Brass Pounders League April 1984

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

Table with 6 columns (1-6) and multiple rows of call signs and numbers. Includes sub-sections for W3CUL, KA9CPA, WA8JIZ, N8BQP, N8AFW, KA1GBS, W1E0F, W9JUU, WA4JDH, W3VR, N4GHI, KA8CPS, KIWJ, WB7WOW, W7VSE, KA1KML, WB2IDS, WECTZ, W7DZX, KT6A, WA4CCK, W9JUU, W88MIO, WB5YDD, and Multioperator stations.

BPL for 100 or more originations plus deliveries:
WD4HO 232
W8FIR 180
K7GV 128
W9FRC 124

1 - CALL 4 - SENT
2 - ORIG. 5 - DLVD
3 - RCVD. 6 - TOTAL

Independent Nets (April 1984)

Table with 4 columns (1-4) and rows for Clearing House, Early Bird, Empire Slow Speed, Golden Bear, Hit and Bounce Traffic, IMRA, Midwest RTTY, Mission Trail, Southwest Traffic, Vermont Slideband, West Coast Slow Speed, 75-Meter ISSB, 7290 Traffic.

1 - NET NAME 3 - TRAFFIC
2 - SESSIONS 4 - CHECK-INS

Contest Corral

A Roundup of Upcoming Operating Events



Conducted By
Edith Holsopple,* N1CZC

JULY

1
Canada Day Contest, June QST, page 74.

4
West Coast Qualifying Run, 10-35 WPM, at 0400Z July 5 (9 P.M. PDT July 4). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3.590/7.090 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7-8
Venezuelan World Wide Contest, phone, June QST, page 74.

13-15
SSTV-DX Contest, sponsored by *AS Magazine*. For more details, contact Mike Stone, WB0QCD, POB H, Lowden, IA 52255-0408.

14-15
IARU Radiosport Championship, May QST, page 89.

14-21
Le Trophée du Tiurai Contest, July QST, page 74.

15
WIAW Qualifying Run, 35-10 WPM, at 0200Z July 16 (10 P.M. EDT July 15). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See July 4 listing for more details.

21-22
QRP Summer Contest, sponsored by the DL Activity Group-CW, from 1500Z July 21 until 1500Z July 22. CW only, 160 through 10 meters. Classes are: A — less than 3.5-W input, single operator; B — less than 10-W input, single operator; C — less than 10-W input, multioperator; D — QRO stations, more than 10-W input, to contact QRP stations. Class C stations may operate full time; classes A, B and D must break for nine hours. Exchange RST, QSO number and input, adding x if crystal controlled. QRO stations add /QRO. Operation is limited to one class per band, VFO or crystal-controlled. No more than three crystals may be used on one band. Contact each station once per band. Count 1 point for QSO with own country, two points for QSO with with own continent, 3 points for QSO with DX (outside own continent) per DXCC list. JA, PY, VE, W and ZS count separately. Count 1 multiplier for each country and 1 for each DX QSO. Multiply points by multipliers on each band, then add band results. Crystal-controlled stations double total result. Submit a separate log for each band. Logs must be received within six weeks of the contest. Send logs (include 1 IRC for results) to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Rep. of Germany.

SEANET Contest, CW, sponsored by the Philippine Amateur Radio Association. Work Southeast Asia stations, from 0001Z July 21 until 2359Z July 22. 160-10 meters, single operator-single band, single operator-multiband and multioperator-multiband categories. Send signal report and serial number beginning with 001 on each band. SEANET countries: A4, A5, A6, A9, AP, BV, CR9, C21, DU, EP, HL, HS, H44, JA/JE/JF/JG/JH/JI/JR etc., JD1, JY, KA, KC6, KG6/KH2, KH6, KX6, P29, S79, VK, VQ9, V85, VS6, VS9K, VU2, XU, XV5, XW8, YB, YJ8, ZK, ZL, 3B6/7, 3B8, 3D2, 4S7, 4X, 5W1, 5Z4, 8Q7, 9K2, 9M2, 9M6/8, 9N1, 9V1. Contacts with SEANET countries count 2 points on 20-15-10 meters; 5 points on 40, 80 meters; and 10 points on 160 meters. (SEANET to SEANET contacts count 1, 3 and 6 points, respectively.) Contacts within one's own country do not count. Multipliers are the number of SEANET countries worked x 3 for others, (x 2 for SEANET to SEANET countries). Send 2 IRCs for results. Send your entry

so that it arrives before October 31 to Eshee, 9M2FK, P.O. Box 13, Penang, Malaysia.

Colombian Independence Day Contest, sponsored by Liga Colombiana de Radioaficionados, from 0000Z July 21 until 2359Z July 22. 160-10 meters, phone and CW. Categories A — single operator, single band; B — single operator, multiband; C — multioperator, single transmitter, multiband; D — multioperator, multitransmitter, multiband. Exchange signal report and 3-digit serial number (HK stations send signal report and 174, indicating years of independence). Count 5 points for HK contacts, 3 points for DX contacts and 1 point for those within your own country. (HK stations count 5 points per non-HK QSO and 3 points per HK QSO.) Multiply by sum of DXCC countries worked on each band, plus different HK districts worked on each band. The final score equals the total QSO points x multipliers per band. Plaques. Mail entry by August 30 to LCRA, Contest Logs and Awards Department, P.O. Box 584, Bogota, Colombia, South America.

25
WIAW Qualifying Run, 10-35 WPM, at 2300Z (7 P.M. EDT) July 25. See July 4 and 15 listings for more details.

28-29
Venezuelan World Wide Contest, CW, June QST, page 74.

28-30
Armadillo Run, sponsored by the Texas DX Society, from 0001Z July 28 until 0202Z July 30. Runs concurrently with the CW County Hunters Contest. TDXS will activate all Louisiana, Mississippi and Arkansas counties; the object is to work as many of those counties as possible during the contest period. Final score equals the total number of above counties worked. Ties will be broken by LA, MS and AR QSO count. Only single-operator entrants operating from their own stations are eligible to compete. Exchange and frequencies are the same as for the County Hunters CW Contest. Operation by the TDXS mobiles will be generally restricted to 14.055-14.075 MHz. Certificates for entrants working at least 50 counties. A plaque will be awarded to the entrant working the most counties. Mail entry/QSL by August 31 to Dennis Motschenbacher, KZ5M, P.O. Box 82, Thompsons, TX 77481.

CW County Hunters Contest, sponsored by the CW County Hunters Net, from 0000Z July 28 until 0200 July 30. Work stations once per band. Work portables/mobiles again as they change country. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles), signal report, county and state (for U.S. stations), province or country. Suggested frequencies: 3.575 7.055 14.065 21.065 28.065. Portables and mobiles call CQ below 7.055 and 14.065; others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles. Multiply QSO points by total U.S. counties worked for final score. Mobiles and portables calculate their scores both on a state-by-state basis and overall for awards. Mail logs by September 1 (include a large s.a.s.e. for results) to Jerry Burkhead, N6QA, 7525 Baltic St., San Diego, CA 92111.

31
West Coast Qualifying Run, 10-40 WPM, at 0400Z August 1 (9 P.M. PDT July 31). See July 4 listing for more details.

AUGUST

4-5
YO DX Contest, sponsored by the Romanian AR Federation, from 2000Z August 4 until 1600Z August 5. 80-10 meters, phone and CW. No crossmode QSOs. Classes: Single operator, single- and multi-band; multioperator, multiband. Exchange signal report and ITU zone. YO stations will send two letters indicating their country. Contacts with own country do not count. Count 2 points per QSO with own continent, 4 points for different continent and 8 points for YO stations. Multiply by sum of YO countries and ITU zones worked per band. Mail entries by September 6 to RARF, P.O. Box 05-50, R-76100 Bucharest, Romania.

ARRL UHF Contest, page 78 this issue.

160 Meter SSB Contest, sponsored by the 160 Meter Wild Bunch, from 0000Z August 4 to 2359Z August 5. Single operators only. Exchange RST/state, country or province (charter members include your number with the exchange). Count 10 points per QSO. Multiply by the total number of states, countries and/or provinces worked. Special multipliers are one point for each charter member worked, 10 points for working club station VE7WCV, and 20 points for working 15 charter members. Plaque to winner, and certificates. Send logs by September 6 to R. J. Koziomkowski, KA1SR, 5 Watson Dr., Portsmouth, RI 02871.

5-6

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, from 1700Z August 5 until 0500Z August 6. Phone and CW, all bands. No repeater QSOs. Most activity will be 40 kHz from the lower end of CW bands and about 3.890 7.230 14.280 21.375 28.675 MHz for phone. IL stations exchange RST and county; others exchange RST and state, province or country. Count 1 point per QSO (2 if other station is Novice or Technician in Novice band). IL stations multiply QSO total by sum of states plus VE provinces plus a maximum of five DX countries. Count additional DX for points but not multipliers. IL portables and mobiles may add 200 to final score for each county from which 10 or more contacts were made. All others multiply QSO points by the number of IL counties worked. All stations may take one bonus multiplier for each eight QSOs with the same county. Awards. Send logs by September 1 (include s.a.s.e. for results) to RAMS/K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634.

6

WIAW Qualifying Run, 10-35 WPM, at 0200Z August 7 (10 P.M. EDT August 6). See July 4 and 15 listings for more details.

11-12

European DX Contest, CW, sponsored by the Deutscher ARC, from 0000Z August 11 until 2400Z August 12. (Phone contest September 8-9; RTTY contest November 10-11). Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry classes: single operator, all band and multioperator, single transmitter. Multi-single stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single operators may operate a maximum of 36 hours. The 12 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band (DXCC list plus call areas in the following countries: JA, PY, VE, VO, VK, ZL, ZS, UA9/0). The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (e.g., 1300/DJ1QQ/134). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Deadlines: CW — September 15; phone — October 15; RTTY — December 15. Mail to WAEDC-Committee, Postbox 1328, D-8950 Kaufbeuren, Fed. Rep. of Germany.

11-13

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z August 11 until 0700Z August 12 and from 1300Z August 12 until 0200Z August 13. Work stations once per band and mode. CW QSOs in the CW subbands only. NJ-to-NJ QSOs allowed. Ex-

*Communications Assistant, ARRL

change signal report, serial number and QTH (county for NJ station; ARRL Section or country for others). Suggested frequencies: CW — 1.810 3.535 7.035 7.135 14.035 21.100 28.100; Phone — 3.900 7.235 14.280 21.355 28.610 50.50.5 144-146. Suggested activity schedule: phone on the even hours; 15 meters on the odd hours 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/VE QSO and 3 points for DX. Multiply by number of ARRL Sections (including NNJ and SNJ, max. 74) worked. Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max. 21) worked. Awards. Mail logs to be received by September 8 to EARA, P.O. Box 528, Englewood, NJ 07631-0528.

18-19

Alaskan QSO Party

24-27

A5 North American ATV Contest

25

WIAW Qualifying Run

25-26

Alabama QSO Party
Occupation Contest
All Asian DX Contest, CW

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received for each QSO claimed for contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.


3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs, and if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated. 

Special Events

Conducted By Edith Holsopple,* N1CZC

Winnetka, Illinois, and Trier, Germany: New Trier High School ARC is sponsoring special event stations W9EDC, DLØTR and DLØBBS June 30 and July 1 to celebrate the 200th anniversary of Trier, Germany, and the 60th anniversary of the club. Operation will be 80-10 meters, 15 kHz from lower General band edges. DLØTR and DLØBBS will also be on RTTY and OSCAR 10. Certificate for working both Trier Germany and New Trier Township, Illinois during 1984. Send QSLs for both QSOs to New Trier H.S. ARC, W9EDC, New Trier H.S., Winnetka, IL 60093.

Evansville, Indiana: Tri-state ARS will operate station W9OG from 1500Z to 2200Z daily June 30 until July 4 in conjunction with the Freedom Festival and Thunder on the Ohio Hydroplane Races. Operation will be in the lower portions of the Novice and General bands, 80-10 meters, all modes. Certificate available from TARS/Special Event Station W9OG, Attn: M. G. Anderson, P.O. Box 3284, Evansville, IN 47732.

Cupertino, California: W23PRI will operate from July 1 to August 31 to commemorate the 23rd Olympiad being held in California. Operation will be Tuesday-Saturday from 0000Z to 0030Z on 7.050 MHz, from 0030Z to 0100Z on 7.110 MHz, from 0100Z to 0130Z on 14.050 MHz, from 0130Z to 0200Z on 21.110 MHz; Saturdays from 1400Z to 1430Z on 21.060 MHz, from 1430Z to 1500Z on 21.110 MHz, from 1500Z to 1530Z on 14.050 MHz, from 1530Z to 1600Z on 7.050 MHz, from 1600Z to 1630Z on 7.110 MHz; and Sundays from 2000Z to 2030Z on 21.060 MHz, from 2030Z to 2100Z on 14.050 MHz, from 2130Z to 2200Z on 7.050 MHz, from 2230Z to 2300Z on 7.110 MHz. QSL to 18954 Pendergast Ave., Cupertino, CA 95014, or via W6QSL Bureau for non-U.S. stations.

Liberty and Independence, Missouri: The PHD ARA will operate WAØUGU/Ø in both cities simultaneously from 0000Z to 2400Z July 4. Frequencies will be 80-10 meters, 4 kHz up from lower edges of General and Novice class band edges. At any given time, when one location is on phone the other will be on CW. The first location worked will tell you where to find the other. QSL for one location worked; certificate for both. QSL via PHD-ARA, Box 11, Liberty, MO 64068.

Junction City, Kansas: The Smoky Valley ARC will operate a special-events station during the Fourth of July Sundown Salute Celebration at Milford Lake. Operating hours will be from 1130Z July 4 to 0500Z July 5 on 160-10 meters. Frequencies will be around 15 kHz up from the lower edges of the Novice and General portions on CW, SSB and RTTY. Certificate via SVARC, P.O. Box 143, Junction City, KS 66441. Certificate also for working any five members of the club from July 1 through September 30.

Bethlehem, New York and Pennsylvania: The Bethlehem Award Station will operate "Xmas in July"

on July 7 from Bethlehem, New York, and on the 14th from Bethlehem, Pennsylvania. QSL to Hen House Gang ARC, W1FHP, Bethlehem, CT 06751.

Chicago, Illinois: The Hamfesters RC will operate W9AA on July 12-15 on 2, 20 and 40 meters. Operation will be in conjunction with a presentation. "Amateur Radio Communications in Operation," at Chicago Ridge Mall.

Monroe, Michigan: The Monroe County Radio Communications Assn. will operate WA8MTX during the Floral City Festival to be held on July 13-14. Operation will be in the General portion of all bands including CW and RTTY, from 1300Z to 2100Z. QSL for certificate to Awards Mgr. Bob Keenan, KD8IW, 3083 6th St., Monroe, MI 48161.

Bourbon County Kentucky: The Pioneer ARC of Winchester will operate WD4GPO from the Bourbon Co. Fair Grounds to commemorate the annual steam engine convention. Operation will be July 13-15 in the General phone and CW portions, with some Novice activity. Commemorative QSL via Pete Clough, WD4GPO, 425 Bell St., Paris, KY 40361.

Atlantic, Iowa: Area hams will operate NØAHP from 1500Z to 2300Z July 14 from the Iowa Good Sams State Sambaore. Phone frequencies will be 21.345 14.245 7.245. Certificate for QSL to Dr. Wayne L. Ball, NØAHP, 503 Lincoln Way, Woodbine, IA 51579.

Paris, Texas: The Red River Valley ARC will operate WB5RDD/5 on July 14 to commemorate the storming of the Bastille. Operation will be 10 kHz up from lower General class hf phone band edges from 1400Z to 2000Z.

Marysville, Michigan: The Eastern Michigan ARC (K8EPV) will commemorate the annual Port Huron to Mackinac Island Yacht Race July 14-15. Operation will be from 1400Z to 0200Z both days on 3.910 7.235 or 14.235 MHz (phone) and 3.710 7.110 or 21.110 MHz (CW). Certificate via K8EPV, 654 Georgia, Marysville, MI 48040.

Plymouth, Massachusetts: The Pilgrim Amateur Wireless Assn. will operate N1AIS to commemorate the 50th anniversary of Camp Norse, Annawon Council, Boy Scouts of America. Operation will be random from the camp between 1200Z and 0200Z daily, July 15-20. Frequencies: 7.290 14.290 21.360 28.990. QSL via N1AIS.

Adrian, Michigan: The Adrian ARC will sponsor W8TQE at the Michigan International Speedway on July 20-22 to celebrate the Michigan 500 Mile Indy-type race cars. Frequencies will be 28.625 21.360 14.240 7.240 3.900 MHz and 10 kHz up from the lower edges of the Novice bands on 80-15 meters. Certificate to Adrian ARC, P.O. Box 26, Adrian, MI 49221.

Warren, Michigan: The Tank-Automotive Command ARC will operate W8JPW from 1300Z to 2000Z July 21 to commemorate the 43rd year of the Detroit Arsenal, home of the nation's first defense plant and the US Army Tank-Automotive Command. Frequen-

cies: phone — 7.274 21.400 146.49 MHz; CW — 7.055 from 1500Z to 1700Z. Certificates via W8JPW, U.S. Army Communications Command, Attn: CCNC-TAC-M, 28251 Van Dyke, Warren, MI 48090.

Wapakoneta, Ohio: Reservoir ARA will operate K8QYL from 1400Z July 21 to 0200Z July 22 from the Neil Armstrong Air & Space Museum, to celebrate the 15th anniversary of the first walk on the moon. Operation will be around 7.260 MHz. Certificates via KR8M, 309 E. Livingston St., Celina, OH 45822.

Gabon, Africa: A joint Boy Scout Jamboree will sponsor a special-event station from July 25 through August 1. Frequencies will be the 10-15-20 meter phone bands. QSL via G3WYN.


Berne, Indiana: The Adams County ARC will operate KC9TZ from 1400Z July 27 to 2200Z July 28 to commemorate Berne Swiss Days. Operation will be 15 kHz above the bottom of the General phone band on 20 and 40 meters, and the Novice CW bands on 15 and 40 meters. QSL via Callbook address for certificate.

Davenport, Iowa: The Davenport RAC will operate WØBXR during the Bix Biederbeck Memorial Jazz Festival from 1500Z to 2300Z July 28 and from 1600Z to 2200Z July 29. Operation on phone and CW, all bands, about 10 kHz up from lower end of General class band edges. Certificates via Davenport RAC, P.O. Box 10304, Davenport, IA 52803.

Greenville, Ohio: The Treaty City ARA will operate W8UMD, the Annie Oakley Special Event Station, from 1400Z July 28 to 0200Z July 29 and from 1400Z to 2200Z July 29. Frequencies will be 3.910 7.235 14.285 MHz. Certificates via TCARA, P.O. Box 91, Greenville, OH 45331.

St. Catharines, Ontario: The Radio Society of Ontario is sponsoring special-event station XØ3SAS throughout 1984, but especially in July, to celebrate the Province of Ontario Bicentennial. QSL via VE3FOI.

Wayne and Piute Counties, Utah: W7YS and WA7NXL will operate portable from these counties during the 1984 CW County Hunters Contest, 0000Z July 28 to 0200Z July 30. Regular contest frequencies on 80-10 meters will be used. Before 0000Z July 28, they will operate on the Novice bands and 30 meters. QSL W7YS, 1400 N. Wakonda, Flagstaff, AZ 86001, or WA7NXL, P.O. Box 201, Flagstaff, AZ 86002.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by July 15 to make the September issue. For the convenience of those wishing to operate, please be sure that the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station are included. 

*Communications Assistant, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADA

ALBERTA: SM, E. Roy Ellis, VE6XC, SM/SEC: VE6XC, A/SM: VE6AJE, STM/DEC/NM (APSN & ATNY): VE6ABC. NARC is heading up radio club links for the Pope's visit this fall. Attendance at 2 club meetings by gov't officials has done much to strengthen the recently signed Memorandum of Understanding between the hams and ADS. The Red Deer Annual Picnic will be held on 22-24 June at Benalto. This is the same weekend for FD. Are you planning for these events?

MANITOBA: SM, Peter Guenther, VE4PG — ASM: VE4AJE, VE4VJ WRIN NM VE4VJ is away on a much needed holiday. VE4AJE is doing a great job for yours truly in the northern part of Manitoba. A lot of changes will be made this year regarding important appointments. VE4HK is stepping down as SEC; VE4FK will take over effective July 1. Other changes will be some net managers who have served us for a long time, which is appreciated. ARES overall will undergo a complete rebuilding. Anyone interested in the EC appointment, please contact VE4FK. I thank all those that are stepping down for their past contributions. MTN QNI 250, QTC 50, sess. 30, MEPN QNI 951, QTC 28, sess. 30, MNM QNI 502, QTC 33, sess. 30. Traffic: VE4AJE 66, VE4RO 34, VE4TE 33, VE4PG 29, VE4AAD 18, VE4BI 16, VE4AO 10, VE4JA 8, VE4LB 7, VE4ID 6, VE4HO 5, VE4AEJ 3, VE4AAU 2, VE4ADS 2, VE4EE 2, VE4AL 2, VE4OR 2, VE4PA 2.

ONTARIO: SM, Larry Thivierge, VE3GT — BM: VE3HVO, PGL: VE3AR, SEC: VE3GV, A/SM: VE3GT, TC: VE3EVO, VE3KXB, Peterborough ARC president, advises their club is offering an attractive distinctive Bicentennial certificate for contacting amateurs in that city. Ontario stations contact 5, other North Americans 2 and DX stations 1. Send 31 and list of contacts (no cards) to Peterborough ARC, P.O. Box 1206, Peterborough, ON K9J 7N1. Thanks to VE3ADP and VE3JIP the Algoma ARC is hoping to publish their club bulletin again on a regular basis. Of interest to RTTYers in eastern Ontario near Watertown, NY: there is a repeater in Fulton, NY 145.33 MHz that is used mostly for RTTY. The owner KW2H welcomes all users of RTTY. At present the "Talking Fingers Net" meets every Sunday night at 2000 hours. Windsor, Welland Co. and North Shore/South Pickering ARCs each held very successful flea markets recently. During July, Ontario amateurs may use the call sign prefix XO to honour Ontario's Bicentennial. Last September, after forming a radio club, the Watacabe ARC started an Amateur Radio course. They have now graduated four amateurs, VE3QEK, VE3QEP, VE3QEN and VE3QEC. Five more are to follow, VE3QFN, CRRR Ontario Director, has been active speaking to a number of radio clubs in the Ottawa area. After 15 years of single handedly preparing the Quinte ARC Club Bulletin, QRM, VE3RL is retiring. Prize winners for the Ottawa ARC Home Brew Night presentations were VE3FUB, VE3KMW, VE3GK. Owing to a number of commitments VE3HTL has resigned as the Sections Traffic Manager. By the time you read this, a new appointment will have been made. Traffic: VE3KX 327, VE3HGJ 297, VE3GT 144, VE3GZ 133, VE3CYR 128, VE3KZ 93, VE3DQ 90, VE3GZ 90, VE3GJ 68, VE3KXB 66, VE3AWF 54, VE3VW 50, VE3WM 46, VE3JAJ 45, VE3GJU 39, VE3GFN 39, VE3WG 36, VE3BDD 31, VE3AJN 30, VE3EHL 14, VE3EWD 13, VE3MCO 9, VE3KXL 5. (Mar.) VE3KXL 8.

QUEBEC: SM, Harold Moreau, VE2BP — STM: VE2EDO, BM: VE2ALE, PIO: VE2ZY, TC: VE2DO, NMs: VE2EDO VE2FSA. Change of call sign: VE2DZX is now VE2JPA. VE2FWE appears to be the first Canadian amateur to legally transmit on the 18-MHz WARC band. He was given special permission to conduct tests on 18.073 and 24.895 MHz, two hours a day, on April 12-15. STM VE2EDO is asking for the cooperation of all ORSs to carry on with the QSN, during the summer schedule. Bonnes vacances a tous, esperant que vous serez actifs durant la saison d'été. Je vous remercie de la annonce de VE2VD, un pionnier de RAQI. Traffic: VE2EDO 92, VE2BP 56, VE2EK 27, VE2EC 23.

SASKATCHEWAN: SM, W. C. Munday, VE5VM — STM: VE5HG, SEC: VE5RP, TC: VE5GF, NMs: VE5BAF, VE5EH, VE5HG, VE5N, VE5OI. The coming of spring and solar flares have reduced amateur activities in SK land. Many VE5 hams visited Dayton again this year and from all reports a good time was had by all. Congrats to those that passed the DOC exams this month. The South West ARC hamfest committee is hard at work and Hamfest '84 in Swift Current is shaping up to be a gala affair on June 30th. VE5AFA, Moose Jaw ARC, was the recipient of a Certificate of Merit for his outstanding service in promoting all phases of Amateur Radio during his stay in Moose Jaw.

ATLANTIC DIVISION

DELAWARE: SM, John Hartman, WA3ZBI — STM: W3DKX, PIO: N3DIP, PSHR: K3JL, W3DKX. Congrats to W3MGD and N3CGH on the arrival of their baby daughter, Jennifer Eileen. DTM: QNI 447, QTC 46 in 21 sessions. DEP: QNI 56, QTC 16 in 4 sessions. SEN: QNI 46, QTC 6 in 4 sessions. Traffic: N3SJ 69, W3QQ 56, W3DKX 44, W3DUD 29, K3JL 28, WA3WJ 26, WA3ZBI 17, K3JGM 7, N3AXH 6, K3SFW 6, K3ZXP 6.

EASTERN PENNSYLVANIA: SM, Mark J. Pierson, KB3NE — ACC: KB3NE, PIO: W3AQM, SEC: WA3PZO, SGL: N3CIP, STM: K3GLF, DEC: K3QCX, K3BLR, K3BUO, N3AIA, N3BFL, W3EEK, A3AC.

Net	Time	Freq.	QNI	QTC	Sess.
7/10 P.M. Dy	3610	443	244	58	
EPAEPTN 6 P.M. Dy	3917	374	183	31	
PTTN 6:30 P.M. Dy	3610	241	125	30	

Local and VHF net reports: (QNI/QTC/sess.) PWAARES 101/6/5; D5ESN 71/4/5; D3ARES 65/6/3; D6ARES 23/5/3; ATN 28/9/8. N3AIA has appointed W3AQN as an assistant EC for York Co. W3AQN has been licensed for 81 years and is very active in ARES/RACES traffic handling. Congrats to one who is a true "ham." DEC N3BFL, needs an EC for Wayne Co. Please contact him if you're interested. W3CCQN and WA3HUD have gone to Jordan to present York ARC's "White Rose Award" to King Hussein, JY1,

who has qualified for the award by working two members of the club, namely, the two YLs presenting it. New appt.: OES to N2BSK/3. Upgrades: WA3JAZ now N3DVO; KA3LL now N3DVS; KA3KJ now N3DUX. Warminster ARC held its annual hamfest on May 20th. Again, it was a great success. I am looking for a volunteer to take over as ACC. All appointees are requested to report their status to SM to update section records. Traffic: N3COV 287, KA3DLY 251, KA3IME 148, N3AIA 131, KB3UD 128, AA3B 108, N3CD 93, WB3KE 55, KC3LY 47, W3ADE 41, W3AQN 34, W3TMY 30, W3GCL 20, W3FAF 19, W3VA 19, AA3C 17, WB3G 16, WA3CKA 16, N3BFL 7, K3NB 6. (Feb.) KC3LY 47, N3BFL 45.

MARYLAND — DISTRICT OF COLUMBIA: SM, Karl R. Medross, W3FA — We are saddened to lose K3MV. He was active in the PONS. N3GN lost his XYL to lengthy illness. Mail reports are down this month. W3CDO's activity is a three-way between W4PPQ and 1TMO. I've got it! W3FZT sends in the WC 2-Mtr net reports, but WA3VDX is net manager! KC3D has been travelling again as has W3DQI. KA3H's newest harmonic keeps him busy at other things! W3ZNV gets around the bands to keep his skeds. KG3Ms has his RTTY OBS sked at a manageable level: 2100 local 147.6/903 Tuesdays and 1830 Saturday 14080 DX bulletins. Plus the Annapolis WB3LAB RBBS simplex 144.91 MHz. This system is up 0800 to 2000 local daily. K3SAV celebrated MSN's first birthday by including the Advanced course. WA3KY is taking a job in Texas leaving the OO/R/FF coordination open. N2AGV is taking over as president of AARC with N3BIN as Vice Pres. W3OY has been doing real well since his illness. Gets his grass cut just like I do! W3LDD completes all counties for the 3rd time around, and his son is appointed circuit judge. Congrats. KC3Y is a mainstay on MSN. KC3DW manages a good t/c count under very difficult conditions. K3JE's 2-meter set has opened up the Eastern Shore with the Delmarva RC thru WB3UE taking advantage of this. KA3EWW volunteered and look at that t/c total! WA2ERT is consolidating his activities. W3UT is back at that place where work interferes with the hobby. W3FZV is about done with Tuesday classes. K3NIN provides a late night outlet to Balto. The solar flares bother WB3FK on his low frequency daytime skeds. WB3GZU got a flat tire on his bicycle! K3KF has the rig repaired, the tower up and soon the antennal W3ABC is busy attending Division hamfests! N3IT just made it under the wire to report a busy month. With the nets (net/manager sessions/traffic/QNI) avg.: WC 2-mtr/WA3VDX 41/19; MDC PON/W3CY 414/13.5; WR PON/WB3BFK 21/26/14; MSN/KC3AV 30/81/9.7; MEPN/K3JE 31/106/28.9. No 100% but 3 or less were N3AGM WA3IHW W3LDD and KC3Y. Traffic: WB3GZU 411, K3JE 202, KC3Y 180, K3NIN 153, KC3DWB 135, KA3EWW 108, W3FA 105, WA2ERT/3 65, KC3AV 62, N3IT 60, WB3BFK 34, W3FZV 21, W3UT 17, WB3FUE 16, W3LDD 14, W3ZNV 14, KC3D 7.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB — STM: WA2HEB, ACC: K2IXE, PIO: WB2RVE, TC: W2JJB, BM: WB2JVB, SGL: W2XQ. Very belated congrats to the Gloucester Co. ARC on their 25th anniversary. At SNJ staff meeting the idea of a "speakers bureau" was discussed. What we would like to have is a master list of names of people who would be willing to speak at various local club meetings on Amateur Radio related subjects. If you are interested in volunteering yourself, or if your club would like a speaker, contact our ACC. Speaking of our ACC, K2IXE keeps a current list of training classes held in our section. For information on the one nearest you, contact K2IXE. From our PIO comes word that he has provided ARRL Public Service Announcement tapes to many radio stations in the section. If you would like one, please let WB2RVE know. Congrats to W2IML on completing his first year as MCN NM. Next month I hope to list where you can usually get in touch with your leadership officials on the air. I hope your Field Day operations were a huge success. 73. Traffic: WB2JVB 196, WB2IKL 181, WA2HEB 85, KA2CQX 40, KA2ANJ 35, WA2MGV 34, KC2PO 20.

WESTERN NEW YORK: SM, William W. Thompson, W2ZMTA — SEC: W2BCH, SGL: KC2X, BM: W2GLH, TC: K2QR, PIO: WA2PJU, OO/R/FF: WA2ET, ACC: N2EH. Job demands require W2ZJQ to step down as STM; TNX FB job. Fred, DEC: WA2AIW, KA2BHR, WB3CJF, KB2DQV, WB2NAC, appointments: OES: KA2BHR, KA2DQA, K2GXT, WA2KJQ, WA2NKC, WB2PIO, K2VLR. Southern Tier lost another great when K2ZRO became Silent Key; developer of the OSCAR Locator, he was a valuable contributor to the AMSAT effort. New Novices in Lewis Co. where ham population is booming — WA2OEP, RAWNY Officers — KA2IWW, W2CUU, KD2V, KA2JWW, National WX Service/SKYWARN awards to N2AGO, N2BQV, KA2DQP, BPL: WB2IDS.

Net	Freq.	Time/Day	NM	QNI-QSP-QND
TTN/OSCAR	145.885	0700/Dy	W2ZMTA	016-000-16
NYS/1	3677	1000/Dy	WB2EAG	301-188-28
W3M/1	04684	1100/Dy	KC2DQ	378-079-30
Mike Farad	3925	1300/MS	VE2FMO	144-054-25
NYPON*	3913	1700/Dy	WA2KOJ	658-393-30
NYSPTEN	3925	1800/Dy	WB2HKKU	678-059-30
ESS	3550	1800/Dy	W2WSS	418-051-29
OCTEN/1*	34194	1830/Dy	WB2HLY	625-104-30
Q Net	31191	1830/Dy	KA2CQM	296-002-30
WDN/1*	04664	1830/Dy	KC2PQ	614-104-30
Blue Line	93333	1900/Dy	WA2SEF	280-017-30
NYS/4*	3677	1900/Dy	WB2MCO	474-253-30
JCARCN	10770	2000/Dy	WA2WAX	379-011-30
OARCN	25285	2000/Wed	K2VTI	045-000-04
BRVSN	055855	2100/Dy	WB2FOU	312-008-30
CNYM*	9230	2115/Dy	WA2PUU	362-058-30
OCTEN/1*	23850	2130/Dy	WB2HLY	238-058-30
STAR*	99339	2130/Dy	N2BLX	
WDN/1*	04664	2130/Dy	KC2DQ	634-038-30
NYS/5*	3677	2200/Dy	WB2MCO	447-355-30

*NTS Net, THIN 3913 at 1830 Sundays, VHF THIN at 2000 Tuesdays 04/64, WNY EC Net Sundays at 2000 on 3955 kHz. PSHR: W2AET, KA2BHR, KG2D, KA2DQA, WA2FJJ, VE2FMO, W2FR, NF2G, K2GXT, WB2IDS, WA2KOJ, WA2MTA, WA2NKC, WB2OWO, KA2QIK, WB2QIX, KC2QQ, WB2RBA

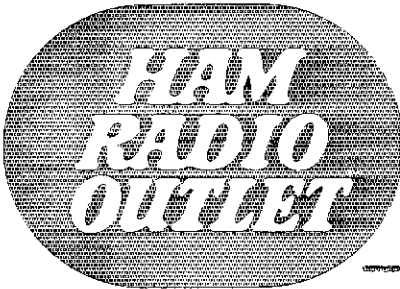
ND2S W2ZQJ: Owego Fest a thousand strong and growing; thanks to STARO committee at Quarter Century mark. K2DTQ completed tenth year of 2M Traffic Watch public service. Upcoming HAMFESTs: Batavia July 8; NYC July 20-22; Trumansburg August 25; Hamburg Sept. 8; Elmira Sept. 29; Syracuse Oct. 13. Traffic Handlers Picnic at Newark Valley August 11. Empire State Games August 16-19; contact WA2PUU to take part. OSCAR 10 FB; join AMSAT for both the both the future and the present! Have a FB summer. Traffic: WB2IDS 579, WA2FJJ 420, W2ZMTA 322, WB2OWO 286, KC2QQ 266, VE2FMO 228, WA2ET 216, KA2BHR 182, WB2QIX 175, W2YGW 142, W2FR 139, WA2NKC 133, WB2RBA 88, ND2S 87, W2UYE 86, W2ZQJ 83, WA2KOJ 77, KG2D 67, K2GXT 64, NF2G 53, KA2DQA 51, W2GL 40, KA2DQB 36, KA2QIK 27, AF2K 23, KB2KW 23, WB2KCT 22, WA2RPO 18, WB2PID 15, K2IUT 11, WA2OEP 9, KC2SJ 8, K2RN 7, K2VR 6, N2BNE 4, WB2NAO 3. (Mar.) WA2SDY 12.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB — SEC: AB3Q, STM: AC3N, ACC: N3EE, OO/R/FF: KN3B, PIO: WB3IJZ, TC: W3FE, BM: W3VAV, SGL: K3HWL. Net QNI QTC Sess. kHz TD
WPACW 307 125 30 3585 7:00P/D
WPAPTN 451 113 30 3983 6:15P/D
WPA2MTN 342 93 30 146.28/88 8P/D
NWP2MTN 348 6 27 145.13/53 0200 UTC
I have three Silent Keys to report, W3CUC, KA3FAP & K3BFO. Our sympathies are with their families. New Novices are KA3MMN & KA3MJJ. Horse-shoe RC officers for 1984-85 are: N3CBD, pres., WB3KGN, v.p.; WA3UP, secy/treas.; Comm. KA3FKK, W3EZN, KA3JQZ, act. comm. The Walk-America was held in Allegheny Co. on April 29. Twenty-two ARES members provided communications in conjunction with local REACT. I would appreciate reports from other counties participating in walks. A dinner meeting was held at the Perkins Restaurant in Meadville on April 13. It was attended by amateurs from northwest Penna. All groups in that corner of the state were represented. On the 14th, the Quad Co. ARC had a dinner meeting also. W3ABC was the principal speaker at both. He presented the QCARC Ham of the Year award to WA3IHK. Each dinner was attended by more than fifty hams and their guests. It is gratifying to meet so many dedicated hams and their XYLs and YLs. NARC's Ham of the Year is W3SAY. Congrats to both. It is nice to be selected by your peers and to know that your efforts are appreciated. Traffic is done this month and some stations have not been on the nets. Don't leave — we need you. Traffic: W3EGK 380, AC3N 144, W3OKN 108, KC3R 74, N3FM 69, WDBPUH 68, WA3QNT 67, WA3UNX 54, K3N3W

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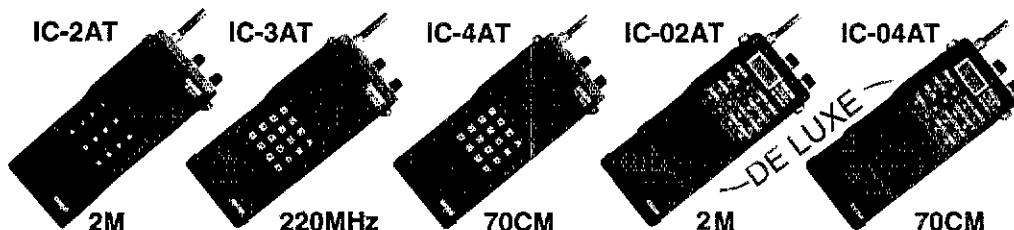
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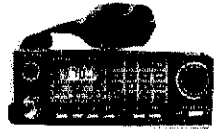
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54, K3SMB 53, K3C3Q 40, K3LTV 38, KA3COX 38, KQ3M 37, W3KJZ 28, K3RUL 28, W3NGO 22, W3MML 22, K3B3V 19, W3KUN 18, W3SN 10, N3CVY 9, K3HCT 7, N3KB 3, W3TTN 2. (Mar.) N3WS 39.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBO — SEC: W9Q9H, STM: K9JX, OO/FHI: K9MX, BM: K9ZDN, PIO: WD9EED, SGL: W9KPT, ACC: W9SFT, ASM: K9ORP.

Net	Freq.	Time/Dy/JTC	QNT	QTC	Sess.
ILN	3650	1330/1000/2000	713	384	30
ITN	3705	0100 Dy	313	79	31
ILPN	3915	2230 Dy (X Sn)	---	---	---
NCNP	3915	1300 Dy (X Sn)	450	56	25
NCNP	7270	1815 Dy (X Sn)	213	108	23
IEN	3940	1500 Sn	139	4	5
IARES	3915	2230 1+3 Sn	59	---	2
ISN	3905	0000 Dy	464	284	30

Illinois was represented to 9RN 100% by stations K9AZS N9DR N9EM KA9FEZ K9RMZ K93I W9INZ KW9J KD9K W9BNVN W9NXXG KP9NG K9QEVW KV9T N9TN and KB9X.
 Illinois was represented 100% to D9RN by stations KW9J W9BNVN KA9FEZ W9H0T W9NXXG and K9AZS. D9RN was represented 100% to CANE. Illinois stations were W9SJDG K9AZS KW9J W9NXXG W9BNVN and KA9FEZ. W9DBO inquired on his CD-210 if credit can be taken in PSHR for participation in CD/ESDA events. The answer is yes! Appointees should take 5 points credit under category 9 for each and every public service event that they participate in. The max points for the category has been removed, so there is no ceiling on PSHR points that can be earned in this manner. W9LNC reports that he is having no trouble adapting to his new lifestyle since his recent retirement! A few problems like that I could use! Congrats to newly appointed Madison Co. EC NA9X, and also congratulating his recent upgrade to Amateur Extra! A note from W9RTD was typical of many reports we have been receiving. Spring windstorms have been taking their toll on many an Illinois antenna farm. RTD got a longwire up to get him by till more permanent repairs can be effected. As was mentioned in a previous Illinois "Section News," WF4R has started at Hq., and is charged with the task of coordinating and supporting ARES activities from the Hq. level. During his recent fact finding tour across the U.S., SEC W9Q9B and I had the good fortune to meet with WF4R for a good part of 2 days while he was in the Chicago area. His first priority is the long awaited and much needed new version of the EC handbook. After this is finished he has a number of other things on the drawing board that will be typical of many reports we have provided service to the public when needed. This kind of support from Hq of the many overworked and thin-spread active members of ARES has been a long time in coming. I think there is reason to believe that we can expect a great deal of support for our ARES activities from WF4R, and that he will be expecting more from us as a group. Let's pull together and work toward that end which is in the best interests of the Amateur Radio service, the ARRL, and the public at large. Traffic: KW9J 633, W9UJ 550, W9BNVN 354, KA9FEZ 348, W9NXXG 194, KB9X 125, W9HXL 123, N9EN 115, K9QEVW 89, W9DBH 84, W9H0T 68, N9DR 63, W9DBO 62, W9RTD 57, KD9K 49, K9JMG 46, K9CJM 46, W9TGO 38, K9NBA 27, WA9SJE 27, W9RTA 24, KA9BBY 23, W9DBH 23, KB9OX 16, W9DH0W 12, W9LNC 12, K93I 10, W9A9R 10, KA9PKG 9, W9VEY 9, K9CMO 6, W9D9CJ 5, KW9L 4, KA9NB 3, W9JMB 2.

INDIANA: SM, Bruce Woodward, W0UM P SEC: W9ZQE, STM: W9UJ, ACC: K9TUS, QTC: WD9ADB, SGL: WA9YGO, BM: KC9TA, PIO: K9DVI, SRC: N9WB, SHC: WA9UD, OO/RFI: K9JG, NMS: IT9 N9QYV, QUN: K9JN; ION: KA9CZD; IFR: K9BSU; VHF: W9PMT; IWN: KA9ERC.

Net	Freq.	Time/Dy/JTC	QNT	QTC	Sess.
ITN	3910	1330/130/2300	2994	374	3218
QIN	3656	1430/0000/2000	734	349	1829
ICN	3708	2315	133	47	781
IEN	3629	0000	26	2	116
IWN	3910	1310	1659	30	470
IWN VHF Kokomo		940	4	255	30
IWN VHF Bloomington		1030	---	---	320

Hoosier VHF nets: QN1 6789, QTC 244, QTR 8722, bulletins 83, sess. 211 for 27 nets. QNR cycle 4 QN1 390, QTC 527, QTR 940. IN 98% stns N9AEI W9EI N9HZ K9J9 W9UJ W9BMD5 WA9OCF W9GLW W9B9UJ K9WVV. D9RN 409 messages in 1341 minutes. IN 100% stns KC9GS W9URQ W9UJ CANE 1159 messages in 30 sess. D9RN 100% stns W9UJ W9URQ. Apts. ORS W9BMD5 W9WEI K9J9, OBS K9J9; EC for Wells Co. N9CBC, for Grant Co. KA9IY, for Fulton Co. W9HLE. We now have 69 counties with ECs. We need ECs in the following 23 counties: Benton, Blanford, Brown, Clay, Dearborn, Dubois, Gibson, Howard, Jennings, Leno, Mercer, Morgan, Ohio, Porter, Pulaski, Spencer, Steuben, Sullivan, Tipton, Van, Millon, Vigo, Warren and Warrick. Silent Key K9BLK, The Indiana Section Repeater Coordinators N9WB WA9CWE and K9LSB, have a new system survey form. It is expected that all systems in the state will receive a copy through the Indiana ARRL Letter. It is hoped that all forms will be completed and returned to the appropriate coordinator prior to the repeater meeting at the State ARRL Convention at 8 A.M., Saturday July 7. Congrats to K9VDQ and WD9EYB, co-recipients of the Wabash Valley Area Brethren Award. The Clark Co. ARC amateur of the year award went to K9EB. Congrats N9AST. Congratulations to all stroke, Cards and best wishes would be appreciated. Congrats to Indiana's newest ARRL affiliated club, the Napanee ARC. The DeVry ARC of Chicago is the VEC for the 9th district. I know the Grant Co. ARC has been contacted and plan for exams in the future. I hope several clubs can work with the DeVry Club. We are planning for a great Indiana State ARRL Convention Saturday, July 7. Hope to see many of you there. Traffic: W9UJ 953, W9EI 205, K93J 191, W9URQ 190, W9B9UJ 174, WA9OCF 144, KM9B 136, W9QYV 104, K99HH 82, W9CNE 80, N9AEI 59, W9UMH 55, W9H7 51, W9JZV 36, W9JMV 32, W9D9MD 29, KA9FFO 28, WD9ART 27, W9PMT 25, W9IOG 25, W9B9T 24, N9CQS 19, K9W9D 17, AB9A 17, WA9OKK 16, K9PUD 12, K9BRF 12, WD9CIV 11, K9FVN 11, KD9IY 10, N9DHX 9, K9KT6 8, KA9LAU 8, K9KN 8, K9WC 8, WD9GT 7, W99OZZ 6, W9ZGC 6, K9SBW 5, W9XD 5, W9DKP 5, K9FW 4, K9KD 4, K9CCG 3, W9UJ 2, W9BDD 2, W9BJA 2, W9B9TOW 1. (Mar.) W9B9UJ 155, N9HZ 37, W9IOH 22, KA9LAU 20, K9KN 11.

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*Mast can be rotated freely

WISCONSIN: SM, Roy A. Pedersen, K9FHI — SEC: W9OAK, STM: K9UTQ, BVN 3984 1200Z QNI 1315, QTC 1431 WD9IDJ, BEN 3985 1800Z QNI 750, QTC 227 W9BESM, W9SBN 3985 2330Z QNI 953, QTC 281 K9ANV, WVN 3723 0000Z QNI 140, QTC 19 KA9BOP, W9SN 3545 0030Z QNI 18, QTC 81 K9CJL, WJW 9362 0100Z QNI 285, QTC 140 W9B9C, W9B9C 362 0400Z QNI 984, QTC 934 K9LGL, XPO 3925 1831Z QNI 223, QTC 18 WA9YVC, NWTN .31.91 0030Z QNI 375, QTC 56 N9BDL Gr. Bay

72112 (Thurs) 0245Z QNI 40 (Mar. 35) QTC 3 (Mar. 4) W9BNRK, WCVNTH, 311.91 0030Z QNI 431 QTC 40 KC9VM, MABA swapfest was well attended. Good to see Central Division Director and Vice Director there. Tri-County ARC W9MQB will be on 3900, 7280, 14280 on July 21st 2nd rd for Palmyra's 100th Old Settlers Day. Special QSLs are available for SASE for confirming contact to Tom Wheeler, P.O. Box 271, Palmyra 53156. WA9YVC is back from Arizona. WA9RBC & XYL are back from Texas. KA9BIK is EC for Air Force MARS for Illinois, Wisconsin, North Dakota, South Dakota, Missouri, Nebraska, Kansas. KD9E has 5-Band DXCC plaque from ARRL. K9BIL has worked 301 countries. KA9CPA made BPL. The Governor's conference on disaster preparedness was a good success. WC9AAG had 137 contacts on 2 meters and 122 on 75 meters and had contacts in 66 counties, thanks to KC9CJ, W9FZJ, W99ESM, W9BNYG for their help. Regret to report WA9ZLP a Silent Key. Traffic: KA9CPA 329, KC9CF 328, W9CBE 268, KC9CJ 202, W9YCV 188, W9IID 166, WA9WYS 151, KA9BHL 131, K9FHI 126, KA9OBP 123, KC9KQ 110, N9BGE 101, W9DND 90, W99ESM 86, W99FRI 85, N9BDL 84, K9UTQ 84, W9LDO 80, AG9G 78, W99ICH 70, W9UCL 69, K9AKG 67, KC9VM 59, KA9AFB 57, W9SO 57, K99B 55, W99JSW 50, N9DHT 43, N9BCX 40, W9FDY 40, W99JGA 32, W9IEM 31, WA9ZTY 29, KZ9V 26, N9CDF 24, WA9YVC 23, KN9P 22, WA9DXB 18, W9UW 17, W9IHW 14, KB9FM 9, KV9P 9, W99NRK 8, KV9U 8, KA9BHK 7. (Mar.) W9BNRK 4.

DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, W9BHOX — SEC; KA9AEP, STM: KD9CI. Hello again! It looks like the hamfest season is off to a good start with the gatherings at Rochester and Bemidji. Upcoming hamfests include the Range Wide Hamfest on July 8th. It will again be at the Clinton Community Center located just east of Hibbing. The Brainerd ARC and the Paul Bunyan Wireless Assn are joining forces to sponsor and to operate a special events station. This station will operate from the Paul Bunyan Amusement Park in Brainerd, and the dates of operation are Sept. 24-26. Look for further updates on this in this column and on MSPN/E. Once again the tornado season is upon us. Let's be ready to assist in the public service if needed. Net Mgrs: KA9ODO assumed MSN Net Mgr post on May 1st. A proposal has been made to have a section group gathering — perhaps a picnic — to coincide with a hamfest; any suggestions? This would include ALL participating amateurs in both CW and SSB nets in Minnesota. More on this later. W99BAC owns new WX Net QNI record with 40. He also won the "Tale of the Tape" challenge with WA9ONE for slimmest waistline! This competition was climaxed by a ceremony at the Bemidji Hamfest with KC9NL as Master of Ceremonies. W90JKI, W99CGM and W99HDD were the judges. New Novice is KA9RSQ. Call sign change: KA9PYA now N9FKU. As of this date (5/1) KC9I is the only announced candidate for SM. The election is scheduled for August. Don't forget, folks, Field Day is coming up! I hope more clubs will set up operations for that big event. The New Ulm ARC has started a radiogram project for Senior Citizens in that area, they report very gratifying results. Fine job gang! Finally, I want to thank KB9VVV for all his help with our Cross Reference Net Catalogs. This is an experiment to expedite the movement of traffic within the section. If this works as well as I hope, it may hold unlimited expansion possibilities. Net Mgrs: MSN/1 W9EHI; MSN/2 KA9EPY; MSSN W9BWXU; MSPN/N KA9JUX; MSPN/E W99BGS; MINAMWXNT W99BAC; PICONET W9HZU.

Net	Freq	Time	QNI	QTC	Sess.
MSN/1	3685	6:30P	334	149	30
MSN/2	3685	10:00P	292	70	30
MSSN	3710	6:00P	—	—	—
MSPN/N	3945	12:05P	636	103	30
MSPN/E	3929	5:30P	1009	240	28
MINAMWXNT	3929	6:15P	665	460	29
Piconet	3925	Daily	2602	225	26

Traffic: N9AFW 1439, WA9TFC 367, KY9I 340, K9UJ 296, KA9EPY 242, KD9CI 218, W9HZU 195, KA9CIR 154, KA9ARP 153, KA9JUX 152, W9CJH 149, W99HDD 127, KD9CI 125, WA9NIE 109, N9CIS 104, W99MFV 77, W9DM 62, K9EFT 54, W9BHOX 47, W90JKI 36, KA9BFP 32, W99BGS 31, KC9NL 27, KC9SE 26, KN9U 25, KC9VD 23, W99LTK 22, KC9T 21, N9JP 18, K9OGI 16, WA9MJF 13, W99JUL 11, KA9AJF 10, KA9ODQ 9, W9KYG 6. (Mar.) K9OGI 20, KZ9R 7.

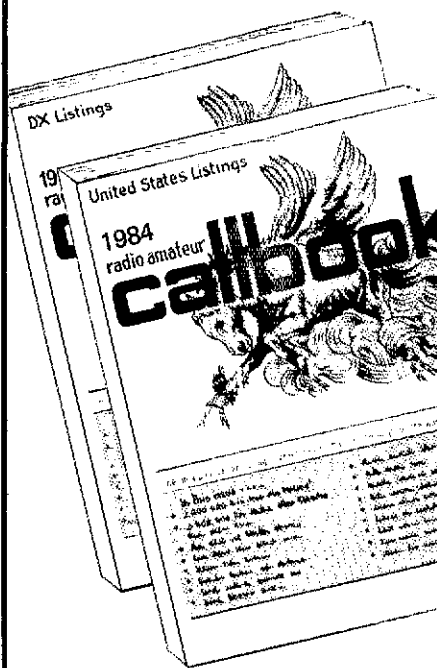
NORTH DAKOTA: SM, Ron Roche, K9ALL — The Theodore Roosevelt ARC (TRARC) will be hosting this year's International Ham Fest at the Peace Gardens. It will be held the traditional second weekend in July. Contact W99DAJ or W99DEMY of Dickinson for details. The TRARC meets the 1st Monday of each month at 7:30 in the basement of the Public Library. They just graduated 8 Novices from their training class. The TRARC is to be congratulated on their fine newsletter and for the many programs they are involved in. W99TE needs your help in the "SKYWARN" prog. Goose River 65 QNI, 2 QTC, DATA Net 291 QNI, 27 QTC. With the tornado season upon us, net participation becomes more important.

SOUTH DAKOTA: SM, Fredric Stephan, KC9OO — SGL: N9DD, STM: W9KJZ, SEC: W9YMB, BM: M9CF5, K9AS. Official bulletins were sent total of 46 times. We surely miss the good words and dry humor of W99SUM. He tried harder than just about anyone all things considered. We have limited space in this small column because of the size of our section, causing ARRL activities to come first, followed by all other reports whenever space permits. Anyone wishing to volunteer help on our upcoming planned S.D. Amateur Radio Newsletter is welcomed. Prairie Dog ARC active again. NTS DTEH liaison stations were W99TH, KC9B, KC9OO, PS9HF, KC9AF, N9EEH, W9CF5, KC9OO, NTS: South Dakota, Evening Emergency Net QTC 23, QNI 77, sess. 25; Southworth Co. Emergency Net QTC 10, QNI 24, sess. 5; South Dakota Sunday Morning Net QTC 3, QNI 66, sess. 5; Southern Black Hills Emergency Net QTC 1, QNI 3, sess. 1; South Dakota Hi-speed CW Net QTC 1, QNI 1, sess. 1. Independent nets: Prairie Dog 2M-Net QTC 3, QNI 17, sess. 4; Noon phone Net QTC 35, QNI 384, sess. 30; Evening Phone Net QTC 14, Informal QTC 26, QNI 1214, sess. 30. Traffic: KC9AF 138, N9CF5 88, KC9OO 48, WA9VRE 43, W99DMF 29, W9YMB 28, W99LV 27, N9EEH 20, N9BD 9, WA9BZD 9, KA9KXG 7, Informal Messages: KC9AF 37, W99DV 36, W99DB 27, KC9OO 11, N9DD 6, W99LV 2, W99JQ 1.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, W9SIF — SEC: N9BPU, STM: A9EL, ACC: ADSM, TC: W9FD, PIO: K5DW, SGL: W5LCI. If your group has not attended a weather spotters course in the past year, contact N9BPU SEC for details. Congrats to the Metropolitan ARC on being the

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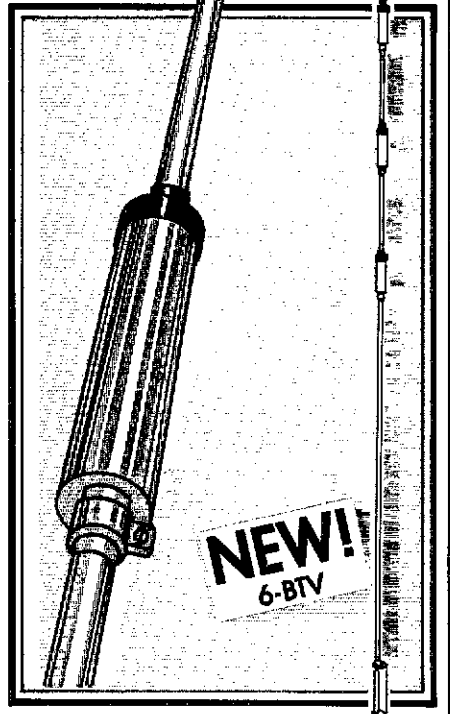
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first Special Service Club in Arkansas. Welcome to Howard Armstrong, KA5DFT, Arkansas Phone Manager effective May 1. I am still looking for a net manager for the Razorback Net. The Arkansas DX Club will hold its annual DX meeting and banquet October 6 at the majestic Hotel in Hot Springs. 1984 ADXA officers: W5LON, pres.; W5ACE, v.p.; KD5ZM, secy./treas. For ADXA info contact KD5ZM, Earl Smith, Rte 10, 7 Meadow Cove, Pine Bluff 71602. Traffic: W90K 40, W5TUM 34, W5DFCE 20, W5UAU 32, W9YCE 32, W55IGF 22, W55GWU 21, K5B1L 14, W5RIT 12, W5K1L 10.

LOUISIANA: SM, John Wondergem, K5KR — SEC: KA5PFB. ACC: K5DPG. SGL: KD5SL. BEAT TENNESSEE IN 84. Louisiana competition for new or renewal ARRL membership for 1st in Delta Div. commenced in May. Monthly winner will be listed in this column and will also receive nice certificate. Annual winner will get a nice plaque. Welcome to KA5PFB as new Section Emergency Coordinator. Baton Rouge火腿 led by BRARC Pres. W5DELJ was tops. ARRL Pres. WARA and Delta Div. Director W5CH were present both days and spoke at the banquet and ARRL Forum. Special thanks to N5CPE for BR Hamfest success. W5URR received W5GIX award for dedication and service to BRARC and community. W5SCOO received the "BR AWARD" for significant contribution to ham radio. New Orleans Hamfest 15-16 Sept at Landmark Motor Hotel in Metairie. 1 Aug is deadline for a guaranteed room at special low rate hamfest weekend. Rates elsewhere much higher because of World's Fair. Don't miss YOUR Amateur Radio exhibit at the World's Fair. It's a masterpiece. Original Marconi comment, displays, ham radio video and much more. Bring your ham license and operate SSB/CW/RTTY/Slow Scan. See last month's QST for nets, times and frequencies. Traffic: KA5HDT 157, K5TL 124, W5GHP 115, N5BFV 52, W55NCM 42, W5LBR 24, N5ANH 23, K5W0D 8.

TENNESSEE: SM, John C. Brown, NO4Q — ASM & ACC: WA4GLS. OO/RFI: W9FZV. PIO: WK4V. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J. TC: W4HHK. It is with great pleasure that I further announce the 1983 TSN "Operator of the Year" award to KA4ZNU. Pat will receive a handsome and applicable plaque, remember that this will appear much after the fact. Congrats for a job well done. Keep up the fine work. The Delta QSO Party is upon us. It will take place from 1800Z Sept. 29 to 2400Z Sept. 30. Logs must be postmarked no later than Oct. 21 to be eligible and sent to N5MLT. Although it is late when you see this, our SEC has suffered another heart attack; we all wish him a speedy recovery. The special event with the Volunteer Club at the helm had a very active operation this year. They also had a chance to show the twelve new hams a little of what AMATEUR RADIO is all about. We can all do a bit of this during the summer months in assisting our great state in the EMERGENCY WX efforts, remembering that these are the first responsibilities of OUR HOBBY. The CW honor roll honors went to KA4BSG W4DDK W4VE K9IM1 and W4ZJY. Good work. Nets: LF ssa, 88, QNI 428B, QTC 112, VHF ssa, 80, QNI 1972, QTC 697, CW ssa, 53, QNI 445, QTC 118; RTTY ssa, 20, QTC 41, QTC 0. The section was represented on DRIS 98% by five stations. Good work. The traffic list is a bit short for the time. Sure would like to list your score here also. How about giving me a message in the first five days of the month and get your call listed. Traffic: NG4J 275, W4DDK 153, W9FZV 144, K4WVQ 85, W4ZJY 75, W4VE 38, KA4BSG 31, W4WOP 29, W4GYT 17, N4AS 17, W4YPO 14, W4TYV 12, K4IV 10, W4PSN 6, W4PMP 6, K4JGW 1.

GREAT LAKES DIVISION

KENTUCKY: SM, Ann Jackson, KA4GFU — SEC: WA4JAV, STM: KA4BGM. BM: WA4AGH, OO/RFI: N4GD, PIO: K4TAJ. A special thanks to our net managers, NCGs and liaison stations. You are the ones that make the system work. Your efforts are much appreciated. Net reports: MKPN 1158/90, KTN 1128/99, KYN 162/59, KNTN 329167, KYPON 41/4, BARES 97/9, CARN 175/16, NKARC 85/0, T5TMN 554/47, WTEEN 36/5, BARES 49/0, AARES 59/8, 7ARES 46/0, 11ARES 89/10. Traffic: WA4JTE 183, KA4O5A 172, W4DBSC 87, KA4BGM 87, KA4MHL 59, KA4EBN 48, KA4SKV 39, KA4MTX 34, WA4JAV 31, WA4EBN 29, W44YI 24, WA4AVV 21, W44ZDU 16, W44D 15, W44CJQ 13, KA4YIV 13, WA4AGH 12, W44X3 11, W44PFB 11, KA4BZ 10, KA4GFU 7, W4PKX 7, N4HTZ 6, KA4HOE 5, WA4YPO 3.

MICHIGAN: SM, James R. Sealey, W8BMTD — ASM: WA8DHB. SEC: WA8EFT. STM: W8BRHU. ACC: K8SB. PIO: K8CK. SGL: N8CNY. TC: W8BBGY. BM: K2BV.

Net	Freq	Time/Day	QNI	Tl Sess.
MITN*	3953	1900 Dy	702	326 30
QMN*	3663	1800 Dy**	944	218 90
MACS*	3953	1100 Dy**	509	152 30
UPN*	3922	1700 Dy	726	94 35
MNN*	3722	1730 Dy	331	62 59
GLETN	3932	2100 Dy	849	56 30
TASYL	3922	1900 M	7	1 1

VHF nets 21 rptts 1575 49 113
NTS nets, Times local. *OMN late net, 2200; MNN late net, 2000; MACS 5n, 1300. ARS net 5n, 3932 1730. ARRL Info net, 5n, 3953 1500. 3532 is MI HF emer. freq. Upgrades reported: to General, KA8PFS; to Extra, W8BRHU. Upgrading is tougher these days. A certain extra amount of drive and determination is needed just to cope with the logistics. My hat is off to those who make it! STM W8BRHU announces the appointment of an interim NM for QMN, W8UE, who will serve until the annual election in Sept. W8UE replaces KV8U whose "early retirement" was forced by work pressures. Thanks, Jack, for a good effort. Muskegon was excellent this year. There was some unavoidable confusion resulting from the move of the state convention to Livonia, but this ended up causing no harm that could be seen. The move to Walker Area was a good one; a very adequate facility, more "hamfest-ish," if you will, and MUCH less confusing than the college! In a word, bravo! There is confusion in our section (elsewhere too, I think) as to what actually constitutes a NTS net. The wording on the local certificates we issue is part of the problem, I realize. Regardless, and especially for purposes of listing in the annual ARRL Net Directory, a net must meet certain activity and liaison requirements, and must be designated as NTS-affiliated by the STM. At present, none but our section-level nets actually carry the NTS designation in MI. NTS stands for National Traffic System; we currently do not have any local traffic nets in MI of which I am aware. A matter of semantics perhaps. But it is a very adequate facility, more confusion which I hope can be understood and eliminated. For the second time since I began writing this column I say "welcome back" to MTU's W8YV, reporting this month with six ops! BPL: K8BCPS. Traffic: K8BCPS 845, W8OHB 412, K8BOWN 232, W8BRHU 203, W8UE 183, K8KQJ 150, W8LRT 133, W8BYMH 133, K8NCRH 120, K8DQJ 99,



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- CALL SIGNS
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To order, call or write Larry Horne, N2NY at Ham MasterTapes, 136 East 31st Street, New York NY 10016. Phone 212-685-7844 or 673-0680. MasterCard and Visa accepted. New York state residents add appropriate sales tax.



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THE STANDARD OF EXCELLENCE

The world of CW, RTTY, and new DUAL AMTOR is as close as your fingertips with the new brilliantly innovative state-of-the-art microcomputer controlled EXL-5000E.*

Automatic Sender/Receiver: Due to the most up to date computer technology, just a console and keyboard can accomplish complete automatic send/receive of Morse Code (CW), Baudot Code (RTTY), ASCII Code (RTTY) and new ARQ/FEC (AMTOR).

Code: Morse (CW includes Kana), Baudot (RTTY), ASCII (RTTY), JIS (RTTY), ARQ/FEC (AMTOR).

Characters: Alphabet, Figures, Symbols, Special Characters, Kana.

Built-in Monitor: 5" high resolution, delayed persistence green monitor — provides sharp clear image with no jiggle or jitter even under fluorescent lighting. Also has a provision for composite video signal output.

Time Clock: Displays Month, Date, Hour and Minute on the screen.

Time/Transmission/Receiving Feature: The built-in timer enables completely automatic TX/RX without operator's attendance.

Selcal (Selective Calling) System: With this feature, the unit only receives messages following a preset code. Built-in Demodulator for High Performance: Newly designed high speed RTTY demodulator has receiving capability of as fast as 300 Baud. Three-step shifts select either 170Hz, 425Hz or 850Hz shift with manual fine tune control of space channel for odd shifts. HIGH (Mark Frequency 2125Hz)/LOW (Mark Frequency 1275Hz) tone pair select. Mark only or Space only copy capability for selective fading. ARQ/FEC features incorporated.

Crystal Controlled AFSK Modulator: A transceiver without FSK function can transmit in RTTY mode by utilizing the high stability crystal-controlled modulator controlled by the computer.

Photocoupler CW, FSK Keyer built-in: Very high voltage, high current photocoupler keyer is provided for CW, FSK keying.

Convenient ASCII Key Arrangement: The keyboard layout is ASCII arrangement with function keys. Automatic insertion of LTR/FIG code makes operation a breeze.

Battery Back-up Memory: Data in the battery back-up memory, covering 72 characters x 7 channels and 24 characters x 8 channels, is retained even when the external power source is removed. Messages can be recalled from a keyboard instruction and some particular channels can be read out continuously. You can write messages into any channel while receiving.

Large Capacity Display Memory: Covers up to 1,280 characters. Screen Format contains 40 characters x 16 lines x 2 pages.

Screen Display Type-Ahead

Buffer Memory: A 160-character buffer memory is displayed on the lower part of the screen.

The characters move to the left erasing one by one as soon as they are transmitted. Messages can be written during the receiving state for transmission with battery back-up memory or SEND function.

Function Display System: Each function (mode, channel number, speed, etc.) is displayed on the screen.

Printer Interface: Centronics Para Compatible interface enables easy connection of a low-cost dot printer for hard copy.

Wide Range of Transmitting and Receiving: Morse Code transmitting speed can be set from

the keyboard at any rate between 5-100 WPM (every word per minute). AUTOTRACK on receive. For communication in Baudot and ASCII Codes, rate is variable by a keyboard instruction between 12-300 Baud when using RTTY Modem and between 12-600 Baud when using TTL level. The variable speed feature makes the unit ideal for amateur, business and commercial use.

Pre-load Function: The buffer memory can store the messages written from the keyboard instead of sending them immediately. The stored messages can be sent with a keyboard command.

"RUB-OUT" Function: You can correct mistakes while writing messages in the buffer memory. Misspellings can also be erased while the information is still in the buffer memory.

Automatic CR/LF: While transmitting, CR/LF automatically sent every 64, 72 or 80 characters.

WORD MODE operation: Characters can be transmitted by word groupings, not every character, from the buffer memory with keyboard instruction.

LINE MODE operation: Characters can be transmitted by line groupings from the buffer memory.

WORD-WRAP-AROUND operation: In receive mode, WORD-WRAP-AROUND prevents the last word of the line from splitting in two and makes the screen easily read.

"ECHO" Function: With a keyboard instruction, received data can be read and sent out at the same time. This function enables a cassette tape recorder to be used as a back-up memory, and a system can be created just like telex which uses paper tape.

Cursor Control Function: Full cursor control (up/down, left/right) is available from the keyboard. Test Message Function: "RY" and "QBF" test messages can be repeated with this function.

MARK-AND-BREAK (SPACE-AND-BREAK) System: Either mark or space tone can be used to copy RTTY.

Variable CW weights: For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3-1:7.

Audio Monitor Circuit: A built-in audio monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode, it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.

CW Practice Function: The unit reads data from the hand key and displays the characters on the screen. CW keying output circuit works according to the key operation.

CW Random Generator: Output of CW random signal can be used as CW reading practice.

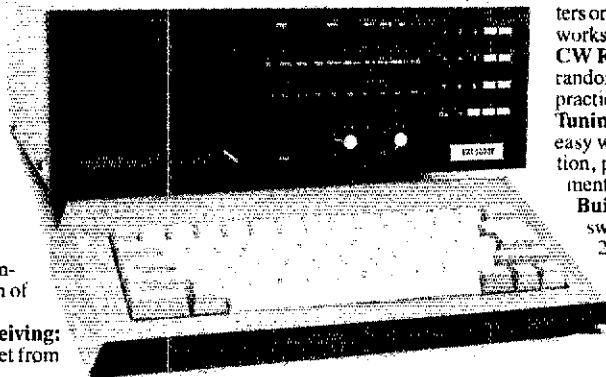
Bargraph LED Meter for Tuning: Tuning of CW and RTTY is very easy with the bargraph LED meter. In addition, provision has been made for attachment of an oscilloscope to aid tuning.

Built-in AC/DC: Power supply is switchable as required; 100-120 VAC; 220-240 VAC/50/60Hz + 13:8VDC.

Color: Light grey with dark grey trim — matches most current transceivers. **Dimensions:** 363(W) x 121(H) x 351(D) mm; Terminal Unit.

Warranty: One Year Limited

Specifications Subject to Change



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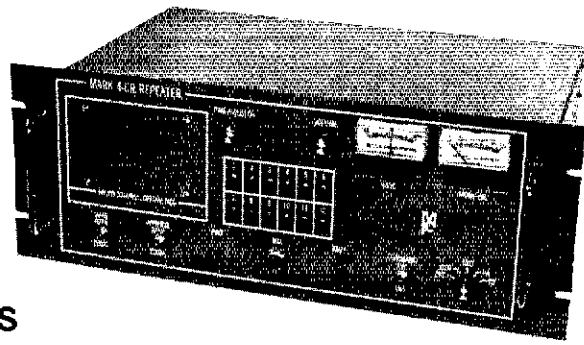
*Dual Amtor: Commercial quality, the EXL-5000E incorporates two completely separate modems to fully support the amateur Amtor codes and all of the CCIR recommendations 476-2 for commercial requirements.

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CN-630 140-450 Mhz Swr/Pwr Mtr	125.00
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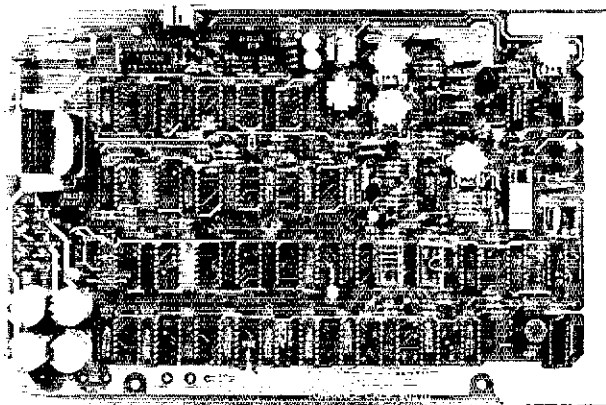
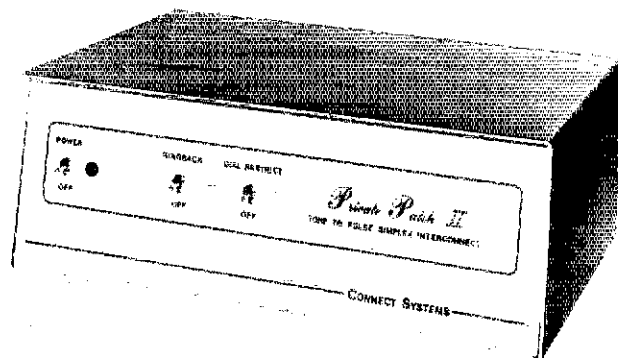
PRIVATE PATCH II is for the discriminating amateur who demands the finest in simplex autopatch performance, features and quality. Our digitally processed VOX and simplex loop create a level of communications quality which is not even closely rivaled. *Please . . . do not confuse our technique with sampling!!* **PRIVATE PATCH II** has the following major advantages over sampling type autopatches:

- Compatible with every known transceiver—yes, synthesized and relay switched types included.
- No transceiver modifications are ever required!
- Connects only to MIC and external speaker jack—no internal connections to your transceiver required.
- Natural push to talk operation—no need to pause—you may talk the instant the button is pressed.
- No annoying repetitive squelch tails
- No potential for repetitive information loss
- In addition to superb simplex operation, **Private Patch II** will operate through *any* repeater from your base location. Yes, *any* repeater! Tone encoding equipment and repeater modifications are not required.

STANDARD FEATURES

- CW identification—ID ROM chip included.
- Single chip XTAL controlled tone decoder.
- Tone to pulse—compatibility with all telephone systems—eliminates critical tone adjustments in the mobile—no wrong numbers, ever! Can be strapped for straight tone dialing.
- Speed dialer compatible—can consume up to 15 digits per second.
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- Ringback (reverse patch)—alerts you with CW ID.
- Busy channel ringback inhibit—will not send CW ID alert if channel is in use—defeatable.
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- Control interrupt timer—assures reliable and positive control.
- Self contained 115VAC supply—230V 50/60 Hz available at slight additional cost.
- Modular phone jack—and seven foot cord.
- 14 day return privilege—when ordered factory direct.
- One year factory warranty.

OPTION: FCC registered coupler.
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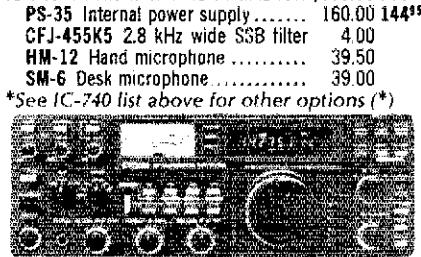
HF Equipment
IC-740* 9-band 200w PEP xcvr w/mic \$1099.00 899⁹⁵
***FREE PS-740 Internal Power Supply & \$50 Factory Rebate - until gone!**

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- *EX-241 Marker unit..... 20.00
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- *FL-45 500 Hz CW filter (1st IF)..... 59.50
- *FL-54 270 Hz CW filter (1st IF)..... 47.50
- *FL-52A 500 Hz CW filter (2nd IF) 96.50 89⁹⁵
- *FL-53A 250 Hz CW filter (2nd IF) 96.50 89⁹⁵
- *FL-44A SSB filter (2nd IF)..... 159.00 144⁹⁵
- SM-5 8-pin electret desk microphone 39.00
- HM-10 Scanning mobile microphone 39.50
- MB-12 Mobile mount..... 19.50

*Options also for IC-745 listed below

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- FL-30 SSB filter (passband tuning) 59.50
- FL-44A SSB filter (2nd IF)..... 159.00 144⁹⁵
- FL-45 500 Hz CW filter..... 59.50
- EX-195 Marker unit..... 39.00
- EX-202 LDA interface; 730/2KL/AH-1 27.50
- EX-203 150 Hz CW audio filter..... 39.00
- EX-205 Transverter switching unit 29.00
- SM-5 8-pin electret desk microphone 39.00
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- MB-5 Mobile mount..... 19.50
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- FL-32 500 Hz CW filter..... 59.50
- FL-34 5.2 kHz AM filter..... 49.50
- SM-5 8-pin electret desk microphone 39.00
- MB-5 Mobile mount..... 19.50
- IC-745 9-band xcvr w/.1-30 MHz rcvr \$999.00 769⁹⁵
- PS-35 Internal power supply..... 160.00 144⁹⁵
- CFJ-455K5 2.8 kHz wide SSB filter 4.00
- HM-12 Hand microphone..... 39.50
- SM-6 Desk microphone..... 39.00

See IC-740 list above for other options ()



- IC-751 9-band xcvr/.1-30 MHz rcvr \$1399.00 1199⁹⁵
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- FL-63 250 Hz CW filter (1st IF)..... 48.50
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- FL-33 AM filter..... 31.50
- FL-70 2.8 Khz wide SSB filter..... 46.50
- HM-12 Hand microphone..... 39.50
- SM-6 Desk microphone..... 39.00
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Options - continued Regular SALE

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- MT-100 Manual antenna tuner..... 249.00 224⁹⁵
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- IC-251A* 2m FM/SSB/CW transceiver \$749.00 549⁹⁵

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- EX-106 FM option..... 125.00 112⁹⁵
- BC-10A Memory back-up..... 8.50
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- PS-35 Internal power supply..... 160.00 144⁹⁵
- PS-15 20A power supply..... 149.00 134⁹⁵
- IC-271A 25w 2m FM/SSB/CW xcvr... 699.00 619⁹⁵
- AG-20/EX-338 2m preamplifier.... 56.95
- IC-471A 10w 430-450 SSB/CW/FM xcvr 799.00 699⁹⁵
- PS-25 Internal power supply..... 99.00 89⁹⁵
- EX-310 Voice synthesizer..... 39.95
- HM-12 Hand microphone..... 39.50
- SM-6 Desk microphone..... 39.00

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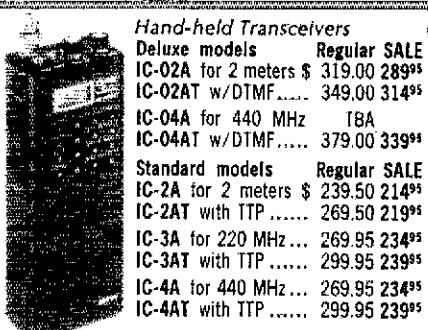
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- IC-3AT with TTP..... 299.95 239⁹⁵
- IC-4A for 440 MHz... 269.95 234⁹⁵
- IC-4AT with TTP..... 299.95 239⁹⁵

Accessories for Deluxe models Regular

- BP-7 800mah/13.2V Nicad Pak - use BC-35 67.50
- BP-8 800mah/8.4V Nicad Pak - use BC-35..... 62.50
- BC-35 Drop in desk charger - all batteries..... 69.00
- BC-16A Wall charger - BP7/BP8..... 10.00

Accessories for both models Regular

- BP-2 425mah/7.2V Nicad Pak - use BC35.... 39.50
- BP-3 Extra Std. 250 mah/8.4V Nicad Pak.... 29.50
- BP-4 Alkaline battery case..... 12.50
- BP-5 425mah/10.8V Nicad Pak - use BC35 49.50
- CP-1 Cig. lighter plug/cord - BP3 or Dlx..... 9.50
- DC-1 DC operation pak for standard models 17.50
- LC-2AT Leather case for standard models.... 34.95
- HM-9 Speaker microphone..... 34.50
- HS10 Boom microphone/headset..... 19.50
- HS-10SA Vox unit for HS-10 (dlx only).... 19.50
- HS-10SB PTT unit for HS-10..... 19.50

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3A-TTN Optional TT Pad - 2A/3A/4A..... 39.50

SS-32M Commspec 32-tone encoder..... 29.95



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- EX-310 Voice synthesizer..... 39.95
- RC-11 Wireless remote controller... 59.95
- CR-64 High stability oscillator xtal 56.00
- R-70 100 Khz-30 Mhz digital receiver 749.00 599⁹⁵
- EX-257 FM unit..... 38.00
- IC-7072 Transceive interface, 720A 112.50
- FL-44A SSB filter (2nd IF)..... 159.00 144⁹⁵
- FL-63 250 Hz CW filter (1st IF)..... 48.50
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- MB-12 Mobile mount..... 19.50



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OHIO: SM, Allan L. Severson, AB8P — SEC: KB8AN. STM: KB0Z. ACC: KB8US. PIO & SGL: N8CVK. TC: KB8MU. Net reports:

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN	377	235	60	6:45/10 P.M.	3.577
BNR	352	106	30	6 P.M.	3.605
BSSN	390	194	56	9:45 A./7:15P.	3.927
ONN	175	44	29	6:30 P.M.	3.708
OSN	332	139	30	6:10 P.M.	3.577
OSSN	2207	784	90	10:30 A.M.	3.9725
				4:15 & 6:45 P.M.	
O6MN	262	16	30	9:00 P.M.	50.160

Thanks very much to KB8AN for the effort he put into the ARES Forum at the Dayton Hamvention. Also thanks to N2BFG, who, at my request, took part of my segment to give us a professional's ideas on amateur public relations. Unfortunately, PR takes so much time from so many of us that actual on-air operating seems to be something that I, for one, hope to do in the future. Dayton gave me the opportunity to visit with many of the new members of the revitalized Ohio Repeater Council. We have a new constitution and five directors working with President WB7UT and Coordinator WA8KKN along with several regional sub-coordinators, all of whom are ready to assist those of us who use repeaters or want coordination. All of us back the FCC's recent position on uncoordinated repeater interference. Last month, a very good Amateur friend of mine made an unheralded visit to the FCC when they were last in Cleveland and came out with his Extra license. He accomplished this after over 50 years in this hobby of ours, retirement from organized work, about 50 years of League membership, heavy activity with the Shriners radio station and its good works, etc. For me, Paul Cornell, WB8FW, epitomizes all that is great and appealing about Amateur Radio to those who love it. My heartiest congratulations and warmest regards, Paul! And as long as I'm on the subject, let's also recognize another highly dedicated amateur, WB8MPV, EC, club president and all around involved guy. His wife, KJ3Q, informs me that new call signs are in the future for them both. It will be wonderful to welcome Joie into the world of the official right-landers. And from the same club, N8EQJ is also a new Extra. STM KB0Z advises that we will be having regular keyboard traffic sessions to try to flow with the thrust of technology in this area. Contact him by radiogram for details. Appointments: to EC KB2P Crawford Co., WB8PHI Lake Co., WD8LIL Erie & Huron Cos. Congrats all.

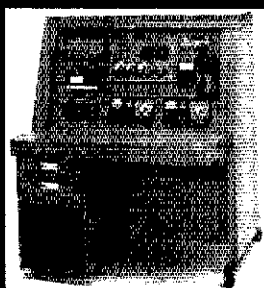
Local Nets QNI QTC Sess.
 ALERT 85 5 4
 BRTN 256 105 30
 COARES 103 21 3
 LCNWO 195 52 20
 MASER 108 5 4
 Medina Co. 331 36 30
 NCTW 21 16 12
 NEDN 186 46 29
 T8RAC 128 99 40
 Traffic: WB8PMJ 804, KB8JDI 358, WB8KFN 357, KB0Z 218, WB8WVD 215, KA8GV 208, WB8QZK 182, NB8CQ 170, WB8MEK 156, KF8J 143, AB8F 143, WB8MIO 135, KB8ND 118, WB8PKF 118, WB8DDMF 104, KA8CGF 103, WB8K 109, N8EVC 79, KB8N 78, WA8SSI 78, WA8MGT 76, NB8X 78, NB8CW 75, WB8O 73, N8AKS 72, WB8WV 71, KB7VG 65, KA8ICB 60, WB8KBW 60, KB8KY 53, WB8IKC 51, NC8Q 50, WB8RGP 50, KA8KH8 49, WA8HD7 47, WB8SZU 42, N8AEH 39, WB8HHZ 37, WA8HMI 36, N8PFP 33, WB8UP 32, WB8JGW 31, KB8TAN 31, WB8HL 30, WB8CXM 27, KB8CKY 25, WB8NHV 24, K3RC 22, KB8VO 22, WB8AYH 21, WB8DYX 18, WB8RM 17, KB8JQ 16, WB8RGS 15, WB8FUP 14, KB8DZ 13, KB8CM 9, N8CJS 8, WB8R 8, KB8MR 7, WB8SRC 7, N8AJJ 6, NB8CF 5, WB8HDZ 5, WB8NTR 5, WB8DOS 4, WB8QL 3, WB8CSP 2. (Mar.) WB8PMJ 400.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VJK — STM: WB2MCO. SEC: AK2E. ACC & TC: N2BFG. BM: WB2EAG. SGL: KB2HQ. Nets: EPN-QNI 150, t/c 84; NYPON-QNI 658, t/c 393; SDN-QNI 413, t/c 98; AESN-QNI 62, t/c 11; ATEN-QNI 21, t/c 4; Schen ARES-QNI 80, t/c 4; SCN-QNI 37; NYS/M-QNI 331, t/c 188; NTS/EL-QNI 921, t/c 609; ESS-QNI 418, t/c 51. C. H. Sills: Schenectady ARA reports new member KA2HQJ. Sills' key KA2KRW. WEGA has several new officers and directors: N2DVO, v.p.; K2ZM, treas.; KA2TXU, secy.; N2DZJ, financial; N2EQ, newsletter editor. Also their upgrades include: N2DVO Adv.; KA2TXU Tech.; KC2ZO Ext. WARA had W2PVS speak on MARS. AARA reports Silent Key W2FEU; their new members are WA2CHE KA2UQJ & WA2TCY. AARA will be helping with NYS Special Olympics Summer Games. AARA members N2AIF and K2QF achieved 5BDKOC; congrats! W2IR had gift of \$50,000 to Schenectady Museum to provide curator for Henry Primm Broughton Memorial Radio Station. Also, Albany, Schenectady and Saratoga clubs have published a 48 page directory of all hams in the capital district. KA4SBF is hoping to get on air on station in Signal. Beat of luck to Tom Field Day. Don't forget W5FLF at National July 20-22! Don't ignore lightning threat, especially this time of year. That new SS equipment is particularly prone to static discharge! PSRR: WB2EAG WB2MCO WA2JBO W2PKY KC2TF WB2VJK WB2ZCM K2ZM KC2ZO W2BIB K2ZVI AR2E KA2OPG KA2TOC N2EQM. Traffic: KC2TF 251, W2PKT 228, WB2EAG 200, WB2MCO 188, K2ZM 164, KC2ZO 160, K2ZVI 113, WB2ZCM 105, WA8MAZ 103, WB2VJK 103, WB2KCR 100, W2BIB 69, K2HNW 69, WA2JBO 53, W2SNA 30, N2EQM 23, AR2E 20, KA2TOC 18, N2BFG 17, WA2CY 17, WA2MV 17, A2ZMY 17, WB2SON 11. (Mar.) WB2ZCM 61. (Feb.) WB2ZCM 240. (Jan.) WB2ZCM 54.

NEW YORK CITY — LONG ISLAND: SM, John H. Smale, K2IZ — SEC: WA2SJB. STM: K2GCG. ACC: WB2IAP. OOIR/IF: N2BT. TC: W2JUP. PIO: W2IYX. NLI CW* 3630 1900/2200 N2AKZ
 NLI PN* 3928 1815 KS2G
 NCVHF 6.145/745 1930 M-F K2MT
 SOVHF 4.775/37 2030 M-F W2GZD
 BAVHF 6.07/67 2000 M-F WB2BNA
 ESS 3590 1800 W2WSS
 NYS/M 3677 1000 WB2EAG
 NTS 3677 1900/2200 WB2EAG

* Denotes section net; all times are local; please try and help out by checking in whenever possible. This is It, July



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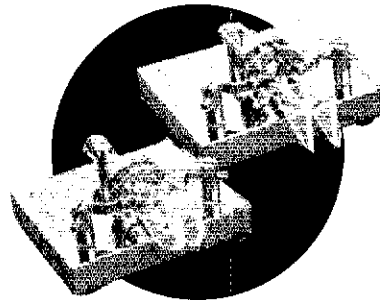
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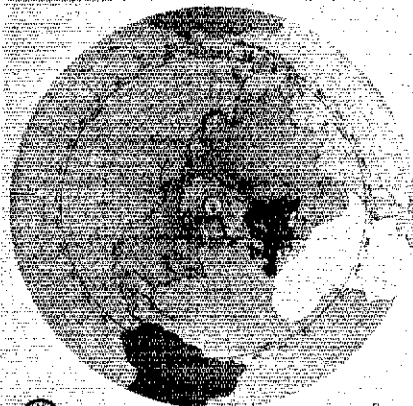
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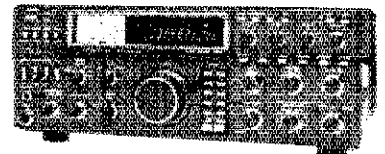
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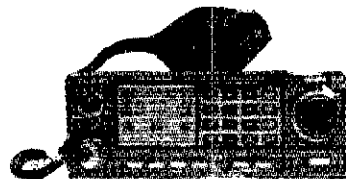


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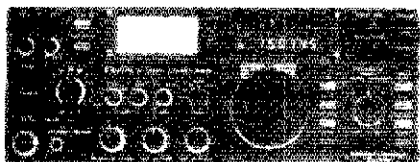
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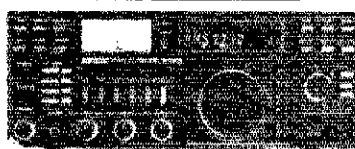


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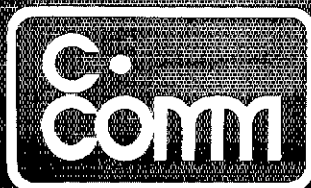
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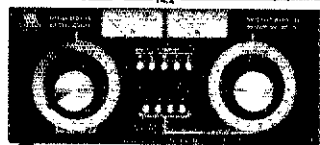
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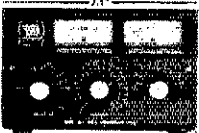
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1984, the month of the ARRL National Convention, July 20-22 at the Hotel Penta, Dr. Owen Garnott, W5LFL, will be the guest speaker at the banquet. Also, there will be lots of forums, exhibits, CQWV, big door prizes, so don't miss it. Suffolk Co. ARC had a nice turn out at their flea market. Please wait for further info on the Volunteer Examiner programs. Here's your chance to help people get started in Amateur Radio by helping to administer the tests for licenses, please try and help as much as you can. WA2ARC has stepped down as the Suffolk Co. VHF Net mgr. How can we ever express our thanks to someone who started a net from scratch, got the liaison going with the HF nets, got people to check in, made just about all the sessions. (The few that he missed can be excused to his dream of the Yankees ever making it to the World Series again.) I hope that that "Thank you, Mike" will be able to cover it. W2GZD has now stepped in as the mgr for the VHF net and we wish him good luck. KE2N reports new Novices at Rockaway Beach. JHS ARC are KA2s UDW UOC UEP UJA UQK UPF UAB UER SNG UPE UOL. Great South Bay ARC has a new repeater operating on 442.625/447.625 MHz. It will be located at Babylon Town Hall in Lindenhurst. Suffolk Co. ARC had KATNH as a speaker for their April meeting. If your club needs a speaker for one of your meetings, to quote SCRC QTC: "Harry is such a good speaker he can make a telephone pole seem interesting." Traffic: N2AKZ 260, K2GCE 132, KC2YZ 114, K2YQK 84, W2GKZ 70, N2BGP 52, KA2TFF 32, N2BT 20, K2MT 15, N2BQD 11, KS2G 10.

NORTHERN NEW JERSEY: SM, Robert Neukomm, KB2WJ — SEC: WB2VUF. STM: W2XD. BM: N2BOP. RCC: W2CC. SGL: W2KB. PIO: WB2NOV. TC: AD7I. ACCs: KK2U KY2B. NMs: W2CC KB2HM WB2RMJ WB2IQU WB2QMP N2XJ WB2ANK W2PSU.

Net	Freq	Time	QNI	QTC	Sees.
NJM	3695	1000 Dy	215	82	30
NJPN	3950	1800 Dy	327	92	35
		0900 Sn			

NJSN	3735	1830 Dy	156	55	29
NJNE	3695	1900 Dy	285	157	30
NJNL	3695	2200 Dy	194	133	30
TCETN	147.255	1930 Dy	142	44	28
OBTTN	147.12	2000 Dy	341	75	30
NJVN	49149	2230 Dy	227	93	30
NJRTTY	147.51	Autostart			

Club News: Sussex Co. ARC worked with the 4th Annual Walk-A-Ride on Sunday, April 29th. The Sussex Co. Computer Club held a meeting at the WAFB and Sharon Akers displays over 100 programs for the Commodore 64. Those hams and people interested in computer use should call 201-875-2835 the computer bulletin board. K2YHY broke a CW pile-up after FIVE hours work to capture BY1PK on April 1st. Let's hope it wasn't "Slim" working BY1PK on "April Fools Day." He also heard XU1SS but didn't make contact. From the Propagator, KY2S has arranged for two buses to go to the national convention in New York on Saturday, July 21st. Eighty seats are available and anyone from other clubs wishing to obtain a seat over to the "Big Apple" at a bargain price call KY2S, or write him at: 113 Grassmere Ave., Ocean, NJ 07712. City of Bayonne Fire Department Management ABC! W2KB has a "neat" computerized newsletter and the club is going to the national convention as a group. They meet regularly the 2nd Tuesday of every month at 7 P.M. at the 16th Street Firehouse (telephone 201-858-6960). "Northern New Jersey Chapter GCWA" reports it requests invitations for their 3rd Elmer of the Year award. Please send your nominations to John Brischler, W2SGI, 34 Franklin St., Little Ferry 07643. "The Ramapo Mountain ARC" newsletter advises that they will be handling the communications for the Oakland Fire Department's 75th Anniversary parade on the 1070 repeater. Ft. County RA News reports they now have a new meeting place at the Franklin State Bank, 336 Park Ave., Scotch Plains. TCRA will have a table at the ARRL National Convention dinner. Sounds like many of the clubs will be well represented. BARA had a very successful fleamarket held at the Bergen Community College in Paramus. KB2WJ will be teaching a course for General class hams at the George Washington Junior High School in Ridgewood. Classes start the last week in September. Enroll now. Traffic: N2JK 339, KB2HM 144, K2VX 140, W2VY 106, W2BKU 80, W2XD 61, WB2QMP 49, WB2GHW 55, N2DZ 44, KB2Y 43, W2BRX 39, WB2ANK 38, KA2QW 25, W2UJ 23, KD2BE 15, W2CC 12, W2NKD 8, (Mar.) WB2QMP 65, (Feb.) KB2HM 541, WB2QMP 59, (Jan.) WB2QMP 45.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, K0CY — SEC: WA4VWV. STM: KA0X. PIO: KB0ZP. BM: K0MR. ACC: WB0QAM. TC: K0DAS. SGL: AK0Q. W0RWC has been selected as the "1984 Iowa ARRL AMATEUR of the Year Award" recipient. He was cited for many operating accomplishments and for his ability to share his experiences with others. Watch DVNPT Special Event Stn for K0BY. FTWVA New reports Oskaloosa 144.895.49, DSM 444.7 (tone). Good FD reports; now on to RAGBRAI. We need your Help! KA0SBJ now Tech: KA0PVQ KA0SBJ now General. New RTTY mailbox in CR.

Net	Freq	UTC	Day	QNI	QTC	Sees.
TLCN	3560	2330/0300	Dy	360	136	60
75Mph	3970	2300/1730	M-S	1927	169	50
ICN	3713	0100	M-F	105	65	18
ITEN	3970	2130	Sn	84	4	4

Aug. 26 is the date for the 75-Meter Picnic at Hampton; see you there. Aug. 19 is DSM Hamfest; Oct 12 & 13 State Convention; Oct 22 is the Seminar. We will be accepting abstracts for the Technical Seminar now. W0RPK K0DAS, W0DFWB and K0GF achieved PSHR this month. DSM hams participated in March of Dimes Walk-a-thon & Olympic Bike Trials. Traffic: W0DFWB 391, K0GF 195, W0SS 130, W0YLS 93, KA0X 73, K0BI 62, K0CY 55, WB0JFF 48, W0HTP 44, K06SC 42, WB0AVW 40, K0CKL 37, KA0ADF 32, W0BW 32, K0BRE 31, N0AR 30, KA0CAH 25, K00BG 22, N0EFG 20, W4JL 19, N0BKB 8, W0B0HF 7, W0LFF 2.

KANSAS: SM, Robert M. Summers, K0BXF — Well, I thought April was turning out to be a good month, then came Sunday the 29th and everything changed. I slipped on a piece of lettuce in the church kitchen, no less, kicked myself in the left ankle while flying thru the air and wound up with a severe sprain. Dr. says at least 4 weeks on the crutch, hope your month is better. By now everyone who qualified, should have rec'd their W5LFL QSLs. Understand the Hiwatha Club also has "The New Frontier" videotape. Ottawa ARC has 3 new Novices with KA0KJL and W0KJL doing the teaching. KD0JM, recently appointed PIO, is already hard at work communicating with the radio clubs and news media and is hoping for more positive public relations and communi-

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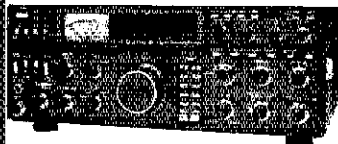
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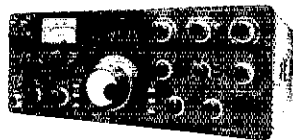
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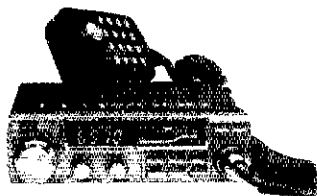
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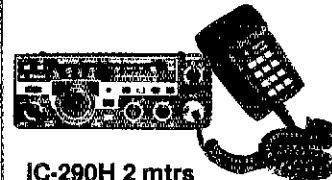
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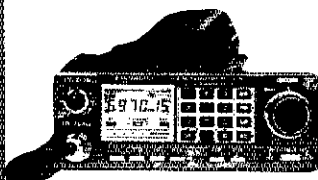
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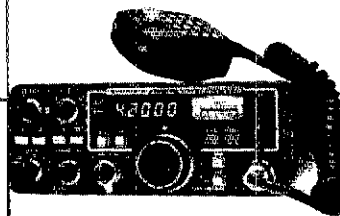
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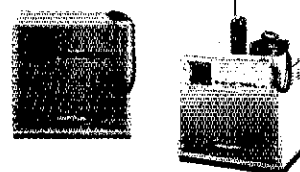
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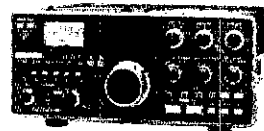
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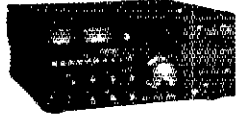
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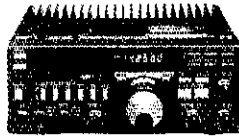
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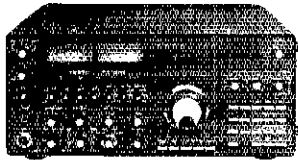
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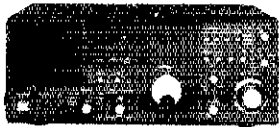
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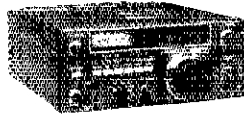
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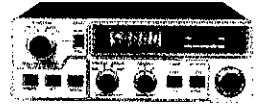
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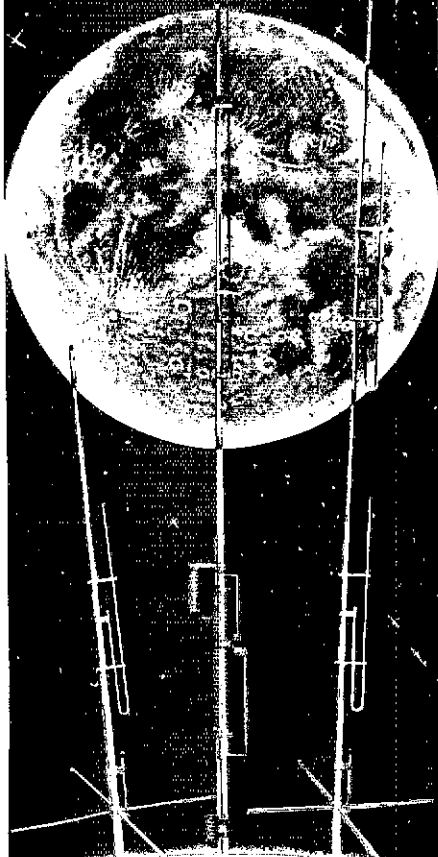
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ty support. If you have something worthwhile that could benefit him in his endeavor, drop him a line. Net traffic as follows: K5BN QNI 1072/QTC 187; KFN 447/27; KWN 792/593; KMWN 882/622; CSTN 926/142; OKS 331/122; QKS-SS 53/12. Trx again to W0QMT and W0FRC for keeping Kansas represented 100% on the Central Area Nets. CKRC of Salina has produced at least 5 new Novices thru the efforts of KB0EC W0BFWK W0CY and KB0BH. I understand W0PEA of Wichita has put together a program on computer hardware and software as it relates to ham radio. Perhaps he would be willing to present the program elsewhere than just for the BEARS. It's worth trying!! Traffic: W0FRC 452, W0RL 383, W0FIR 321, W0LBS 124, A0OE 108, K0EI 89, W0EJ 88, W0OJ 77, W0FDJ 67, K0BKF 45, W0QMT 32, K0DJM 18, W0PB 16, W0CHJ 16, K0GSC 16, W0MYM 13, N0BDG 8.

MISSOURI: SM, Ben Smith, K0PCX - As of May 1st, K0PFGN became net manager of the Missouri Traffic and Training Net. The MTTN became operational Feb. 1, 1983, with N0DDZ as net manager. The MTTN has provided many novices with the opportunity to learn net procedure. Stations that participated on MTTN are active members of MON and other NTS CW nets. We want to thank N0DDZ for his efforts as net manager and getting the net started, and to wish lots of luck to K0PFGN as new net manager. The net meets Monday through Saturday on 3,730 kHz at 7:30 P.M. local time. Call up its MTTN, Jefferson Barracks ARC 1984 officers are W0ADS, pres.; W0E2ZP, v.p.; W0GEMS, treas.; W0SL, Secy. Congrats to W0MUM on receiving the Missouri-Kansas Amateur of the Year award. The award was presented at the PHD Hamfest Banquet. K0QVW was named Heart of America ARC Novice Roundup winner and won an IC 745 at the PHD Hamfest. That is getting off to a good start in Amateur Radio. Silent Keys reported: W0VRF W0UL. Our sympathy to their families and friends. It was great to see the large traffic counts reported by Missouri stations last month, but large or small everyone should report their traffic activity for the month. The North ARA has a new repeater on 145.43. It is all homebrew and is controlled by a Vic-20 computer.

Stn	Sess.	QNI	QTC	NM
MON	80	319	258	K0SI
MOSSB	30	838	118	K7SY
MEOW	29	552	26	K0DSQ
MTTN	24	103	22	K0PFGN
PHD	5	109	11	W0HRF
PTN	9	15	5	W0BROQ
RRARN	25	305	3	K0BKR
CMEN	6	161	2	K0PCK
LAAN	5	48	2	W0BRHC
IFN	4	34	2	W0KNF
LOZFM	4	96	0	W0RTL
JCCF	5	62	0	K0W5F
CARL	3	24	0	K0B8

Traffic: W0BMA 273, K7SY 242, K0SI 201, A0BO 166, K0PCX 105, N0DN 77, W0BYJX 66, W0UD 55, K0ONP 38, N0EVC 36, W0HOP 35, KY0U 19, W0AKUH 11, W0NBU 10.

NEBRASKA: SM, Reynolds Davis, K0GND - Packet radio is the talk of the section! Following the presentation at the Midwest Division Convention in Kearney, believers are everywhere! W0QEN, one of the first from Nebraska on with packet, is interested in organizing a state-wide group. Freq. coord. W0WRI has proposed that 145.70 MHz be used for 2-meter packets. The Lincoln Communications Society has a beacon on 144.05 MHz operating from the QTH of K0KKN in Ceresco. We need more ops on NCW nets which 0000Z are at 002 & 0315Z on 3637 with 7037 as alt. The Elkhorn Valley ARC has a nice new format for their monthly bulletin. W0BYDI is the new EC for Madison Co. VHF grid standings are being maintained. K0BOC. If you have info for wire section bulletins please pass to either K0GND or W0EEMR. Traffic: W0BTD 163, K0DKM 157, W0KK 142, K0BEB 75, W0ZNI 42, W0SGA 34, W0SCP 32, W0BEG 27, K0IXY 25, K0BWM 20, K0GND 16, W0LJO 16, W0QOX 16, W0BQO 15, N0DN 15, W0BGR 12, W0BOK 9, W0NIK 9, K0BOC 8, K0ELI 6, K0FEW 3, W0GMO 3, K0DF 2, W0VZR 2.

NEW ENGLAND DIVISION
CONNECTICUT: SM, Pete Kemp, K1KD - SEC: K1WGO. STM: K1EJC, O0RFF; K1TML, ACC: N1AZF, SGL: K1AH. PIO: W0BIDA, BM: K0ZJJ, TC: W1HAD.

Net	Freq	Time/Local	QTC	QNI	NM
CN	3640	1900/2200	251	312	K1EIR
CPN	3965	1800 Dy/1000 Sn	134	274	K1BHT
NVTN	28/88	2130	54	241	W1EML
WCN	78/18	2030	105	347	W01GXZ
RTN	13/73	2100	60	286	K1JAN

Happy 4th of July to all. Welcome K1KI back to our section's OO program. Upgrades: Adv. - K1KMG; Technician - K1HZW, K1KPS, N1CRA; Novice - K1LLX. Many special events will be taking place on the air with this month's Olympic games. Be aware that many temporary third-party agreements will be in effect. Congrats to all those amateurs who assisted with communications for the Olympic Torch Run through Connecticut. The Milford Repeater ARC runs Westlink broadcasts on Tuesday and Wednesday evenings at 2000. They also carry the teleconferences, as does the 147.15 ICRC repeater. The AREA club provided communications for the Diet Pepsi/YMCA Road Race. With sadness I report that W1UFO is a Silent Key. The 147.375 machine will soon have a 10-meter satellite receiver link in S. Killingly, K01HH has recently completed the requirements for 5-Band DXCC. The CQ Radio Club is sponsoring Novice/General classes at the JCCO Branch in Torrington. The SAARC has provided communications for the River Runners Triathlon. Congratulations to W1NJJM upon his election to the position of ARRL Honorary Vice President. His accomplishments are many. He is probably best known as the developer of the National Traffic System. Hope that everyone had an enjoyable and productive Field Day. K1KD will be conducting an In-Service Course for Industrial Arts teachers on implementing Amateur Radio activities in the schools. This course is sponsored by the State Department of Education, and will be held in Aug. Traffic: W01GXZ 383, W1EFV 381, W1NJM 132, K01K 105, W1KRF 102, K1ACF 74, W1JAN 72, W1BHT 61, K1AGW 55, W1BDN 39, K1AXG 32, K1KX 30, W09HH 25, K1JJK 10, W1CUH 7, W1QV 6.

EASTERN MASSACHUSETTS: SM, Rick Beaba, K1PAD - STM: K1GBS, SEC: W1IAY, ASM: K9HL, ACC: K1AZE, O0IRF1 & BM: W44STO, TC: K11IU, PIO: W1TIDA, SGL: K1BCN.

Net	Mgr	Freq.	Time (loc)/Dy	QNI	QTC
EMRI	W1LPM	3.658	1900/2200/Dy	335	352
EMRIPN	N1BVG	3.959	1730/Dy	261	233
EM2MN	K1AMR	23/83	2000/Dy	387	114
N0EPN	K1BZD	3.945	0830/Sn	72	9
HHTN	K1MI	04/64	2230/Dy	418	289
EMRIS	N1BHH	3.715	2030/Dy	171	115
C12MN	N1BYS	045/645	1930/Dy	185	50

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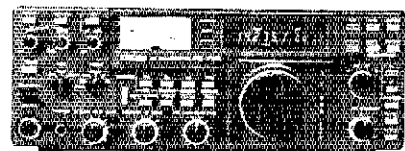
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| FL-52A 500 Hz CW filter | 96.50 | 89 ⁹⁵ | |
| FL-53A 250 Hz CW filter | 96.50 | 89 ⁹⁵ | |
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| RC-10 External frequency controller | 35.00 | | |
| CR-64 High stability reference xtal | 56.00 | | |
| IC-745 9-band Xcvr/1-30 MHz Rcvr | \$ 999.00 | Call | |
| PS-35 Internal power supply | 160.00 | 144 ⁹⁵ | |
| CF5-455K5 2.8 KHz wide SSB filter | TBA | | |
| IC-271 H 100w 2m FM/SSB/OW Xcvr | TBA | | |
| IC-271 A 25w 2m FM/SSB/CW Xcvr | 699.00 | Call | |
| IC-471 A 10w 430-450 SSB/CW/FM Xcvr | 799.00 | Call | |
| PS-25 Internal power supply | 99.00 | 89 ⁹⁵ | |
| EX-310 Voice synthesizer | 39.95 | | |
| IC-290 H 25w 2m SSB/FM Xcvr | | Call | |
| IC-22U 10w 2m FM non-digital Xcvr | 299.00 | 249 ⁹⁵ | |
| EX-199 Remote frequency selector | 35.00 | | |
| IC-25A 25w, 2m, grn leds, up-dn-TTP mic | 359.00 | 319 ⁹⁵ | |
| IC-25H as above, but 45 Watts | 389.00 | 349 ⁹⁵ | |



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|---------------------------------|--------|-------------------|--|
| IC-27A 25w 2m mobile Xcvr | TBA | | |
| IC-45A 10w 440 FM Xcvr, TTP mic | 399.00 | 359 ⁹⁵ | |
| EX-270 CTCSS encoder | 39.00 | | |
| BU-1 Memory back-up | 38.50 | | |

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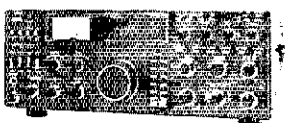
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| IC-02A for 2 meters | \$ 319.00 | 289 ⁹⁵ | |
| IC-02AT w/DTMF | 349.00 | 314 ⁹⁵ | |
| IC-04A for 440 MHz | TBA | | |
| IC-04AT w/DTMF | TBA | | |

Standard models

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|--------------------|--------|-------------------|--|
| IC-2A for 2 meters | 239.50 | 214 ⁹⁵ | |
| IC-2AT with TTP | 269.50 | 219 ⁹⁵ | |
| IC-3A for 220 MHz | 269.95 | 234 ⁹⁵ | |
| IC-3AT with TTP | 299.95 | 239 ⁹⁵ | |
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| TL-922A 2K AMP | \$1229.95 | Call | |
| SM-220 | 359.95 | | |



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| TW-4000A | 599.95 | Call | |
| VS-1 | | Call | |
| TR-9130 | 529.95 | Call | |
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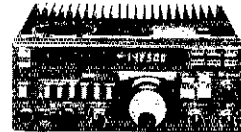


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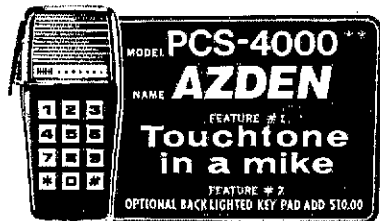
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will be bearing fruit I hope. He is certainly making the rounds of all the local clubs that will give him time in an effort to bring out the troops for the Shriners convention during July. Two huge parades are planned and a massive communications effort is planned. Congrats to KA1MAR who is the new net manager for EM2MN; many thanks to N1BNI who was his predecessor for a number of years. Fairmount CW and KC9P kept the members sharp recently with a drill and by helping with the Dim Valley Walk-a-thon. 19-79 member WA1LEZ is proud papa of a 8-lb 22 oz baby boy. Waltram RC is publishing a series on the origins of 04/64 and the Heavy Hitters and who else would know more about it than K1MON. Framingham club's Novice Norwood Club had W1CT give an interesting talk on the history of CW going back to the turn of the century. Middlesex Club Newsletter had an article on end fed antennas for 80 and 160 meters by KA1SA. Rumor has it that warm weather will aid in the Massachusetts ARA repeater's antenna becoming vertical again after being rendered horizontal after the last ice/snow storm. Quantawpitt RA has found a new lower cost meeting place at the Wakefield/Lynnfield Methodist Church. Colonial Wireless Club busy providing communications for Lion's Club Road Race, Lexington PM parade, Paul Revere's Ride, and the Walk for Hunger. Meanwhile the Wellesley club provided its annual services to the BAA Boston Marathon under the able leadership of WA1ZLQ. Greater Lawrence Club had a talk on QRP by W1FMR. Billerica club had the section Technical Coordinator, KA1IU, give a talk on the state of the art in slow scan TV. Traffic: KA1GBS 1026, N1BGW 361, KA1EXJ 330, N1AJJ 227, N1BHI 199, K1CB 101, K1ABQ 90, KA1EPO 89, N1BQG 82, W1EJE 77, WA1DM 75, KA1DXD 59, KA1AMR 58, KA1MI 51, WA1FNM 49, K1GN 48, K1BZD 36, N1CJL 29, W1QLL 17, W1ZHC 14, K1II 13, W1MJ 13, WA1FCD 9, KE1U 8, K1LCO 6, W1XA 5, KA1EID 3, K1OGF 2. (Mar.) K2LP 298, W1CE 33.

MAINE: Sm, Cliff Lavery, W1RWG — SEC: KL7JG. STM: AK1W. PIO: KA1TJ. TC: KQ1L. OO/RFI: W1KX. BM: W1JTH. ACC: KB1JF. SGL: K1NIT. Augusta EARU provided comms Jaxxes' Superwalk by N1BCF N1CJO N1CMZ N1CVZ WB1DPK KA1DLZ KA1FKS KA1FMM KA1FTO KA1HMB KA1IUJ W1JTH KA1KXY KQ1L K1NIT W1TGY. EC KA1ONG reports participation in ARES drill at Farmington hosp (overtaken school bus) by KA1TJ KB1JF KA1GPO (2 meters), Abbot hamfest Aug. 11-12. Windsor Hamfest Sept. 8.

Net Sess. Checkins Tfc NM
SGN 25 881 18 K1GUP
PTN 49 381 146 AC1GWA1YNZ
CMEN 8 181 23 W1WCI
MPNS 5 79 6 KL7JG
AEN 4 52 6 WA1YNZ
RACES 5 53 3 W1RWG

PSHR: W1RWG AK1W N1BJW WA1YNZ WB1GLH KL7JG WB1BCP. Traffic: WB1BYR 128, WB1CBP 118, AK1W 117, W1RWG 113, W1ISO 97, N1BJW 93, N1BLZ 83, WB1GLH 72, W1BMX 76, KA1BPJ 48, W1JTH 41, KL7JG 34, W1KX 32, WA1YNZ 31, W1WCI 11, N1BME 10, KA1FTL 9, W1EZR 8, KA1KFC 8, KA1EML 4, W1OTQ 4, KA1ENM 3, W1AHM 3, W1CTR 3. (Mar.) W1EZR 8.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — STM: W1TN. N1S: N1NH K1TM K1KE. The NH FM Assn. Hamfest will be Sat. July 14. Contact W1KZG for details. New officers for GBARA are: W1HJT, pres.; KA1JLJ, v.p.; KA1JYR, treas. WA1PEL WB1BRE & KA1LDS visited ARRL Hq. KA1UQB now KB1MV. W1QYQ received the rare GPSN certificate. W1UJN vacationed in W6-land. At last, notice in time to put in the column. Wish all clubs would do this. Nashua ARC Novice course starts in Sept. with K1HDO as Instructor. AK1E has new IC2AT. Amherst ARC new officers are: W1XC, pres.; K0UNJ, v.p.; W1FBX, secy.; WA1HXH, treas. Enjoy the summer but don't forget Sept 29 & 30 ARRL Convention in Boxboro, MA. Traffic: K1KE 302, K1TM 298, N1CPX 210, W1TN 133, N1NH 126, AK1E 125, W1EJE 118, W1BDF 50, N1AKS 42, K1POV 36, W1MHX 34, WB1GXM 33, N1YMH 27, N1ALM 21, K0UXO 21, W1VPT 19, KA1HPO 13, WA1PEL 12, N1CJL 8, KA1HRN 6, K1SIS 2. (Mar.) WB1DFP 6, W1LQ 4.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — Acting SEC: KB1G. STM: W1EOP. TC: AB1D. NM: WA1OSL. ACC: N1BEE. SGL: K1DA. URI RC graduated 10 new Novices from class taught by ORS KA1EK and KF1T. KA1LEK top score in RI and 2nd in NE for 1984 Novice Roundup. Traffic: W1EOP 1001, KA1KML 596, WA1CRY 69, KA1IEK 35, K1AOS 32, WA1GSO 27.

VERMONT: SM, Reed Garfield, WB1ABQ. Summer sked shaping up now. VTN picnic at KRV's July 28... BARC Int'l Hamfest Aug. 11-12... Hope to see you all at one or both! All tlc reps send June and all subsequent activity reports to KDR via POB 123, Milton US468. Real nice to hear W1KRV on 2M and expect to hear lots from him with the new amp. Also good to hear you all the old familiar voices back from the southland. Nets: VTN N1ES 30/148, V1SEN 29/428/91, VFM1N 30/379/75, GMM 25/30/31, VFN 5/69/5, Carrier 25/65/22, CVFMN 5/93/5, RFD 3/5/19. Traffic: KDR 110, N1ARI 90, W1KRV 51, AE1T 45, WB1ABQ 29, N1COB 21, W1OAK 20.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T — TC: KA1JMM. OO/RFI: N1CM. PIO: WB1CJH. SEC: WB1HH. STM: W1UD. Large message fair in early April was held by W1YK. W1UD almost made BPL by helping them move traffic into NTS. No. Worcester ARES busy with comms for Ayer-Groton Walkathon for Blind and Deafness-Fitchburg YMCA Race. Provin Mt. had program on ATV. Look for K1UB from Olympics special event station. Check you plan your Fall activities, will you qualify for Special Service Clubs? Summer is upon us and it's time to head off for boats, cottages and trips. Have a good holiday and drive carefully. PSHR: W1PJO W1KX WB1HH KA1T K1JHC KA1EK W1JRA. Traffic: W1UD 486, W1PUO 344, KA1T 186, W1JRA 105, W1KX 89, WB1HH 88, WA1YYW 58, K1JHC 44, K1PUG 43, K1JYJ 42, KA1EK 40, WA1OPN 25, W1JP 16, KR1R 11, W1ZPB 11, W1SJV 11, WB1HKN 7, WB1F8V 6.

NORTHWESTERN DIVISION

ALASKA: SM, David W. Stevens, KL7BE — STM: KL7T. SEC: KL7GS. PIO: NL7CP. OO/RFI: AL7FL. The FIRST VE test in the nation was given April 17 in Anchorage by VEC Director KL7HFC, KL7CO (the nation's first VE), and KL7KL 3rd VE. Results were ten new Technicians and six new Generals. Congrats to Vivian Johnson for receiving the call KL7YJ. Alaska VEC board director is KL7HFC, not KL7MO as reported in May. Other VEC members are NL7P and NL7D. WL7K was challenged by NL7CO of Anchorage. ARC to club Field Day contest with trophy. Traffic: KL7YV 66, AL7FJ 36.

IDAHO: SM, Lem Allen, Jr., W7JMH — STM: W7GHT. SEC: KD7HZ. PIO: WB7PFC. OO/RFI: KU7Y. Convention: Wyoming, Idaho, Montana & Utah (W1MU) Hamfest will be at Jackson Hole, WY on Aug. 3-5. This is the big one — don't miss it! *People and Things:* W7IWB back from CA trip. W7JMH back from OR trip. WA7TXX back from WA trip. K7CGX back from Hawaii. Most of the snowbirds are back home (WA7RUT W7HPH W7PKA K7GJN WB7ARG K7OJD) from AZ and other warm spots. KA7CJJP now on 2 meter rig. ARRL awards reports by W7GHT reports only 8 descamps during April, none by amateurs in the 7th call area. W7JMH has filed a nominating petition for Idaho SM. W7IWB has been appointed EC for Red Cross and Salvation Army in Idaho.

Net Freq. Time (DT) Sess. QNI QTC
Farm Net 2935 8 P.M. Dy 30 1951 35
Idaho CD 3990 8:10 A.M. M-F 22 818 33
IMN 3635 9 P.M. M-F 21 260 117
TV Emg. 145.44/84 9 P.M. Sn 4 212 35
BOI CD 2M 146.34/94 8:30 P.M. Sn 5 251 0

General: Drop in on a club meeting this month. Traffic: W7GHT 282, KA7CJJP 77, W7JMH 49, K7FM 7.
MONTANA: SM, Les Belyea, N7AIIH — More upgrades received. KA7SBO KA7SIP K7AII KA7OZC KA7SBX KA7MMJ KA7SIS KA7OIX KA7OYU KA7RMJ. To Gen — N7GAE KA7OLK WB7BEZ; to Adv — WA7IUV KA7JBI N7FLT KA7NMJ; to Extra — K7TAZ. Sorry to report that W7MM and WA7RMV as SKs. The RACOM (repeater advisory committee of Montana) met in Helena and elected: WA7ZMC, chairman; WB7ETT, v. chairman; WA7FOB, secy. If you would like a copy of the state's repeaters, send a SASE to K0PP. Nice to see a good section turn-out at the NW Div Convention. Also thanks to WB9IHH from ARRL Hq. for visiting Montana. Our ACC WB7TVC has been busy visiting as many clubs as time permits. W7 from Charlo is the new net mgr. for the IMN. Also K7AF is the mgr. for the Farm net. K7FO is the editor of a very fine EME newsletter. PSHR: WB7WVD KF7R. Net Sess. QNI QTC Mgr. MTN 29 1438 175 K87BE MSN 4 38 0 K0PP IMN 21 260 117 KY7I Traffic: KF7R 97, WB7WVD 92, N7AIK 37.

OREGON: SM, William Shrader, W7GMU — STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. RFI: AK7T. OO: N7SC. TC: N7ENI. New Notice calls in Oregon: KA7600 KA7SOQ KA7SSS KA7SFU KA7FSH KA7SVO. W7CVL and Lady will be celebrating their 50th wedding anniversary. N7FN had his QSL chosen as "QSL of the Week Award" by a school group studying Amateur Radio via WB2JKJ. PARD held a CW sending contest with hand key recently. AL7W and W3XV both sent at top speed of 23 WPM but 3XV had all senders out of all senders. Congrats to all! WA7UYR ended up with a broken leg while trying to keep hit by riding a bicycle. Success. Chuck! The gang from Hoodview are learning to communicate with the JA stations in their own language, so if you hear a couple of Portland stations conversing in Japanese, you'll know why. The Jefferson Amateur Radio Society (JARS) should have their new repeater up on Onion Mt in southern Oregon in May, complete with solar power backed up by wind generator. Oregon section has a Technical Coordinator: Jim Fox, N7ENI, has been appointed. He will try to help you find solutions to technical problems and coordinate technical article submission for QST. OSN QNI QTC 616. Traffic: W7EJE 154, KX7T 278, K7GV 257, K7OVK 213, W7ZB 193, AL7W 189, KT7T 86, K1TY 75, KX7T 68, N7BVG 50, KA7AID 45, W7LNE 23, KV7F 21.

WASHINGTON: SM, Joe Winter, WA7RWK — STM: K7GZC. SEC: WB1IH. PIO/SGL: W7CKZ. ACC: K7RS. OO/RFI Coord.: KB7WC. BM: KD7G. TC: KU7JI.
Net Freq. Time(2) QNI QTC Sess.
WARTS 3970 0100 3093 229 30
WSN 3590 0145/0445 632 258 80
PSTS 145.33 0030/0530 189 129 60
NTN 3970 1900 1125 64 30
EVTN 146.04 0030/0530 82 78 62
NWSSB 3945 0130 794 52 30

Hamfests, etc.: W1MU Jackson WY July 21-22; Western Convention in Irving Park OR 7/27-29; Okanagan HF 7/28-29; NW DX Conv. Beaverton OR GA 8/1-2; NW 7/28-29; NW Country Cousins Washougal WA 8/3-5; CBN Picnic Swauk PK 8/4-5; Tacoma Hamfest PLU 8/11-12; Int'l Picnic Pt. Angeles 8/19; Walla Walla HF Mtn. Frwr. 9/22-23. Can't be at two events at a time but I'll see you at all the others. Enjoyed meeting you at the Pvr sd Andrs in Longview. Good program by Aldon Jones (NC) on Mt. St. Helens today; the NWSSB Dinner in E'burg was great as was Sunday breakfast; Skagit HF was again a real pleasure; a good turnout and a swell time made the Inland Empire Swapfest in Spokane a success. My visits to Lower Columbia & Clark Co. clubs were fun. I presented the old QST JAR to the PCT in Columbia for the library. WWDXC: 496 TOTEM Awards are issued. Remember the DX rpt. 147.00 (down 60) to raise contacts for DX stns needing the award. WWDXC/PCT mbr K7JA made over 2000 QSOs at BY1PK & XY1 WA7WMB gave many YL QSOs. Look for BY7AA then fall along with stations from BY1.4 & 8. CGARC mbr WB7NWA hiking along in the mountains met some young fellows. They chatted and went ahead. Later she heard a scream and ran to the scene to find one had fallen over a 60' cliff and was badly hurt. She called WA7VBA for help. A chopper was sent on the Snake Rvr. April was month of intense activity of parades, thons. road rallies, runs with hundreds of hams providing a service. Congrats! WB7VSS accepted award for area Hams from Spokane Chapter of American Red Cross. Traffic: WB7WOW 602, W7DZX 571, KS7I 431, KR7L 272, W7LG 233, KD7ME 225, K7GXZ 172, K7ANE 134, W7HNA 124, WA7BDD 81, K7CTP 74, W7IEU 64, KR7F 42, W7GB 42, W7APS 27, KD7G 27, K7AJT 16, W7LUP 15, K7OXL 7, N7FXM 6, W7AIB 3. (Mar.) N7DDP 77.

PACIFIC DIVISION
EAST BAY: SM, Bob Vallio, W6RCG — ASMs: W6ZF N6DHN. SEC: W6LKE. STM: N6GA. EBARC members who

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FEATURES

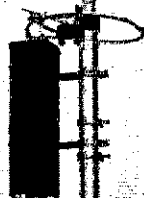
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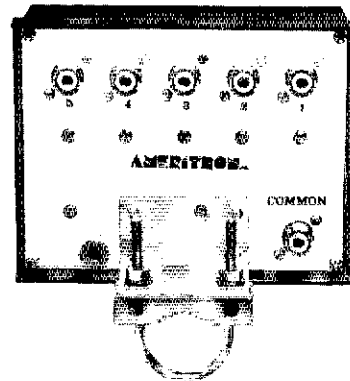
The Ameritron RCS-8 is a remote controlled coaxial R.F. switch that allows you to operate up to five separate antennas with only one coax feed line.

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The control console has indicator lamps that show which antenna is in use or at ground.

The RCS-8 operates from 120 VAC 50/60 Hz line voltage. A 240 VAC export model is available.



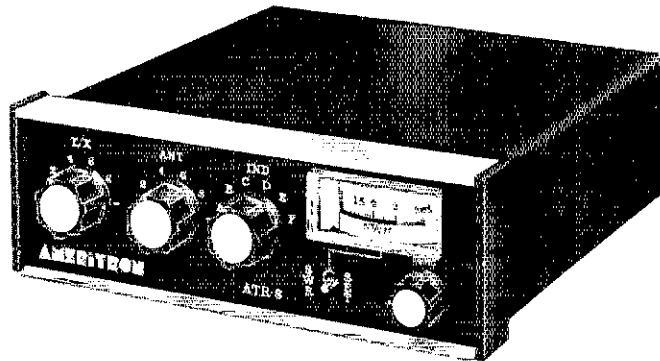
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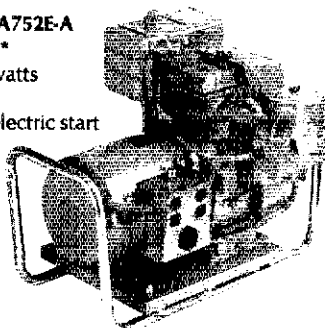
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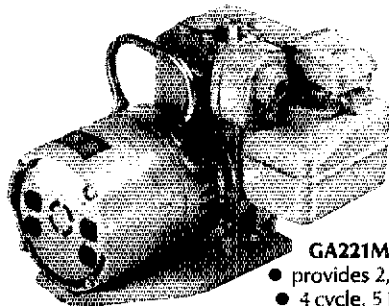
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58TV	80-10 mtr. Vertical	\$99.00

ROHN STEEL TOWER ACCESSORIES

3/16	EHS guy wire (3990 lbs.) 1000'	\$148.50
1/4	EHS guy wire (6650 lbs.) 1000'	\$165.00
5/32	Cable - 100'	\$36.00

ROTORS

Alliance HD-73 [10.7 sq. ft.]	\$89.00
Alliance U-110	\$44.00
CDS-CD45-2 (8.5 sq. ft.)	\$121.00
CDE Ham 4 [15 sq. ft.]	\$195.00
CDE Tailtwister [20 sq. ft.]	\$243.00
Hynam HDR300 [25 sq. ft.]	\$460.00

ROTOR CABLE - 6 COND.

[2-18 & 6-20] 4080 per ft.	\$0.18	
[2-16 & 6-20] 4090 per ft.	\$0.35	
RG8A	Mini 8 low loss foam per ft.	\$0.17
	500' roll	\$75.00
RG8U	Columbia Super Flex-\$26/100' - 450'	\$120.00

Beacon

BC100-programmable hand held	\$239.00
8 band, 16 channel	
Dx-1000- shortwave radio, 10khz-30mhz	\$499
BC300-7 band, aircraft, prog	\$349
BC20/20-40 ch, aircraft, 7 band, prog	\$279
BC250-50 ch, 6 band, prog	\$259
BC260-16 ch, 8 band, prog	\$259
BC210XL-18 ch, 6 band, prog	\$209
BC201-16 ch, 8 band, air, prog	\$199
BC200-16 ch, 8 band, prog	\$169
BC180-16 ch, 8 band, prog	\$159
BC5/6-6 ch, crystal hand held	\$119



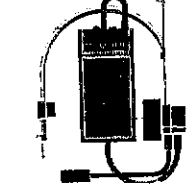
D100- 10 ch, 6 band, prog.	\$119.00
MX5000- 25-550mhz, 20 ch., prog	\$399
D810-8 band, 50 ch, aircraft	\$239
MX3000-6 band, 30 ch, prog, AC/DC	\$179
Z-30-6 band, 30 ch, prog, AC/DC	\$179
Z-10-6 band, 10 ch, prog, AC/DC	\$149
D310-6 band, 30 ch, prog	\$149
R1040- 6 band, 10 ch, programmable	\$129
HX650- 6 ch, crystal hand held	\$79
HX1000-program hand held	\$199

\$179.00 CR2021 Uniden

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49 mhz, FM 2-WAY RADIO with hands free operation, voice activated transmit range up to 1/2 mile



MODEL 49S batteries not included \$39.95

SANYO IBM SOFTWARE COMPATIBILITY

MBC550- 16 bit, 128K memory computer with FREE SOFTWARE \$995 FREE SANYO MONITOR

5 1/4" SSDD FLOPPY DISKS

Bulk-lots of 100 only, with sleeves	\$1.49/ea
MD1- Maxell pkg. of ten	\$20.95
MD1- Fuji pkg. of ten	\$19.95
Type A- Memorex pkg. of ten	\$19.95
Plastic library box \$2.00 with purchase of any 10 pack	

provided comms for the Berkeley Earthquake Test were KA6WAG WA6ZV KB6CGX WA6JSO WA6KTL KA6OLK and N6IA. The club has its FD site chosen and plans brewing. QAZ NBARA, the North Bay ARA's newsletter has a new editorial staff. Outgoing editor KB6UJS has been replaced by new editor N6BLL, with N6IIP in charge of production. LARK is accepting nominations for new officers. They will celebrate their 25th anniversary in July. MDARG mourns the loss of member WB6KML. Their members provided comms for the Mt. Diablo Trail Ride and the March of Dimes Walk-America in Pleasant Hill and Concord. ALCO RACES members provided comms for the Walk-America in Oakland, Alameda and Hayward. Traffic: WB6VOM 189, N6IA 174, KA6AG 158, NV6T 152, K6APW 139, WB6DOB 100.

NEVADA: SM, Leonard M. Norman, W7PVB — SEC: WB5VDV, STM: W7BS. WADG has made application for Special Service Club. KC7YZ reports W7CKH is a Silent Key. K7ZOK WA7UJO KA7GCU and K7ICW attended the VHF Conference. Column is short this month for lack of interest on the part of those reporting their activity. Traffic: W7BS 78, W7PVB 10.

PACIFIC: SM, James Wakefield, AH6CO — Thanks for your reports in the past. In smooth things out and coverage will be given to all areas at the section. Information must come from you. KH6S reports that rescue efforts were made for the Haleakala by KH6S KH6MY and KH6JJ. There were many others but these are reported. KH6GMP and KH6IJ are active and working DX on OSCAR 10. Any others? AH6PR is a very sophisticated repeater with many features of unusual nature, even to synthesized voice ID. Pacific Division Convention is to be held in Santa Clara over Labor Day weekend. I will be there and would like for all KH6 to check in with me at the headquarters hotel. Appointments are still open for any grid all — just ask! Traffic: KH6RC 64, KH6S 57, KH6HJ 49. (Mar.) KH6B 195.

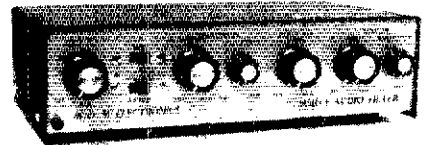
SACRAMENTO VALLEY-SM, Ron Menet, N6AUB — SGL: WB6WFG, SEC: WA6ZD, STM: W6CQ, OJRFI Coord: WB6TNC. If you are interested in serving as an OO or on a Section Health and Welfare Traffic Team, please contact WB6TNC or KY6Q. If you are interested in any other section appointment, contact me directly. Sacramento Valley SKYWARR Net has completed two full years of daily operation. Meets daily, Mon-Fri, at 0800 Local on 147.015+. More members are always welcome. YAFS had another very successful effort at UCD Picnic Day with a traffic total of 99. North Hill Ham Swap appeared successful though less well attended than last year. Auburn CDF VHF Appreciation Dinner was well attended and appreciated. Upgrades: N6VWV, KB6DORW, KB6EHA, KB6EHH, KB6EHC, KB6EHD, KB6EHE, KB6EHF, KB6EHG, KB6EHH; Extra — NX6P, Traffic: N6CVF 77, KA6YSC 48, N6YR 39, N6EPP 29, N6JGC 18, WA6ZUD 18, N6AUB 14, KB6DCP 12, WB6SRQ 6, KA6HID 1.

SAN JOAQUIN VALLEY: SM, Charles McCannell, W6DPD — SEC: WA6YAB, STM: N6AWH, TC: WA6EYV. New appointment: OBS, K6RAU who will send bulletins on RTTY on 3615 kHz at 9:15 P.M. local time Sundays, Mondays, and Wednesdays. Renewed appointment: EC, WA6KZV. W6PZC and KB6VDQ are SILENT KEYS. Officers of Tulare Co. ARC are W6MOT, pres.; WD6ET, v.p.; K6JP, secy.; KA6YXG, treas. KA6OMB is N26M. ECs are desperately needed in Mono and Mariposa Cos. Please contact W6DPD, WA6YAB if you can help. KB6BFS is a novice. WB6RKE has RTTY. W6BYS has a TS-430. WB6FIS has a Tempo S-15. N6GJJ has a TS-430S. W6XP has a Mirage 6M amp. W6PXP lost a tower and beam in recent winds. WA6YAB raised his tribander. W6KGCW chases DX. The K6RAU Code Course is now on the air 12 months a year. Check around 3865 kHz from 0630 to 0700 Pacific time. The course starts the first Monday of each month and lasts for 20 sessions. The APRL Pacific Division Convention is Labor Day weekend at Santa Clara. Traffic: N6AWH 116, WA6YAB 38, WD6FIS 8, W6SX 8, W6DPD 7, K6PMG 6.

SANTA CLARA VALLEY: SM, Rod Stafford, KB6ZV — SEC: K6ITL, STM: W6PHT, TC: KH6LE, ACC: W6MKM, PIO: W6BPL. April brought a number of opportunities for section amateurs to show their emergency preparedness capabilities. On April 24 an earthquake shook the south Santa Clara Co. area with quite a bit of damage centered in the Morgan Hill area. Many hands responded to the call for damage assessment throughout the section and it was quickly determined that the most damage was centered in Morgan Hill. WA6SH/R, WB6QOS/R, W1PW/R and WA6ADZ/R were used extensively in handling emergency communications and earthquake related traffic. Four days later, a Medex exercise took place. The purpose of the Medex was to give emergency communicators some practice in handling emergency traffic but as it turned out, the real thing in the nature of the earthquake gave all some practice in the handling of emergency traffic. WB6CNL report that the two incidents went well from a communications standpoint, but there's still some room for improvement and coordination. To that end, newly appointed SEC K6ITL has been visiting groups of ECs and AECs throughout the section for the purposes of assessing manpower resources and providing some guidance in making sure that all parts of the section can adequately respond to any need for emergency communications. WD6CZY, chairman for the 1984 Pac. Div. Convention, reports that planning for the Labor Day affair at Marriott Hotel in Santa Clara is coming along well. Forums on emergency communications, traffic handling, APRL, legal or selected topics from Part 97, DX and contests, a CW contest, satellite program and various technical forums and talks are confirmed at this writing with many more to be added later. A Wouff Hong is also planned if "experienced" amateurs will step forward to help conduct the initiation. The convention committee is still soliciting suggestions about forums and programs to include, so if you have a suggestion please contact one of the following convention committee members: W6PIH W6PHT K6K6 AE6M K6LHQ K6BDE K6BTO K6KZ K6HLE W6D6G KB6ZV. With a full 2-1/2 days of convention time available, there should be plenty of programs to satisfy everyone. WB6JUL reports he has appointed two new AECs for P.A. Red Cross. N6JUL reports he has appointed two new AECs charged by solar power. The Monterey NPSARC participated in several public service events recently including the Special Olympics, the March of Dimes Walk-a-thon and the U.S. National Race Walking Championships. WA6FKK gave a very interesting talk to PAARA on communications satellites. W6RFF talked to EMARC about the VEC program and related matters. K6FS and WA6AZP are closely watching the City of Menlo Park proposed ordinance dealing with antennas. Seems the City would like to control the use of satellite receiving dishes but has in fact lumped almost all antenna installations into the first few drafts of the ordinance. Be sure to listen in to the following SCV Section Nets on Tuesday evenings

MSB-1 AUDIO FILTER

SSB/CW/RTTY
 \$84.95



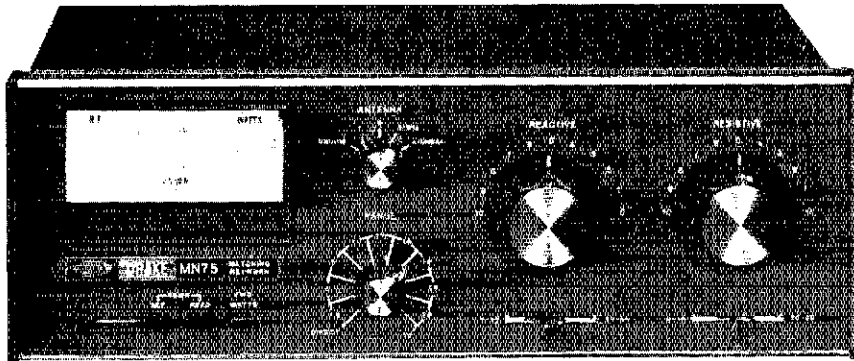
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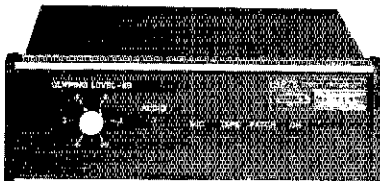
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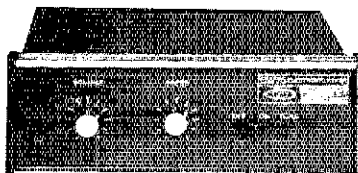
DRAKE MN75 ANTENNA TUNER

The Drake MN75 matching network will optimize your system performance with a surprising range of features and flexibility. From 1.8 to 30MHz., the MN75 matches balanced lines, coaxial lines, or random wires. (Optional B-1000 balun required for balanced lines.) RF output and VSWR readings are available at the push of a button. The rugged MN75 is rated at 200 watts continuous duty and features antenna switching as well as bypass capability. Get maximum power to your antenna system with the Drake MN75.



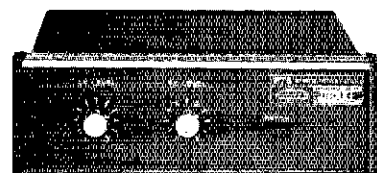
DRAKE SP75 SPEECH PROCESSOR

The Drake SP75 Speech Processor packs the punch it takes to be heard! The SP75 is an RF type speech processor designed to give your signal that needed boost when the going gets tough. Connect the SP75 between your microphone and your Drake TR7 or TR5 — that's all! Front panel switching gives you a bypass option as well as phone patch or tape player input. Special muting circuitry even allows you to operate VOX while using the SP75. The clipping level is adjustable and the LED indicator shows the proper audio input level.



DRAKE CW75 ELECTRONIC KEYS

A no-nonsense keyer for the '80's: the Drake CW75. Smooth iambic keying (grid block or direct) is at your fingertips with either a squeeze key, semi-automatic "bug", or straight key. 5 to 50 WPM capability with front panel speed control. Built-in side tone monitor with volume control. Operates from an external 7 to 14 volt supply or a nine volt optional internal battery.



DRAKE P75 PHONE PATCH

Use your station to its fullest! The Drake P75 Phone Patch puts you on the front lines of amateur radio public service. With the P75, your station can be that vital link between the remote location and the folks back home. The P75 is a hybrid patch for use with the Drake 7-line or other transmitter/receiver combinations. Features such as in/out switching and adjustable RX/TX level controls make the P75 Phone Patch the choice you can count on.





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2C120-25 The same 120 watt output with your 25 watt FM mobile! Usable from 5 to 35 watt drive! Guaranteed bandwidth 138-154 MHz! Maximum DC current: 13.5 amps at 13.8 Vdc. Weight: 3 lbs. I/O Connectors: SO-239 (50 ohm UHF). Automatic carrier operated antenna switching. Reverse polarity protected. VSWR protected. Continuous duty rated. Reg. #179.95.

2C060-2 This intermediate range amplifier is ideal for the simplex operator who wants to RE HEARD! 60 watt minimum output with 2 watt nominal input at 13.8 Vdc. Usable from 0.5 watt input (10 watt output) to 5 watt input (70+ watt output). Guaranteed bandwidth: 138-154 MHz! Maximum DC current: 10 amps at 40 watt output and 13.8 Vdc. Dimensions: 5.0x7.5x4.5 (HxWxD) inches. Weight: 2.5 lb. I/O connectors: SO-239 (UHF 50 ohm). Automatic carrier operated switching. Reverse polarity protected. VSWR protected. CONTINUOUS DUTY. Reg. #124.95.

2C030-2 The workhorse of the industry! For the repeater operator who needs to keep even with those mobile radios. Nominal 2 watt drive for 30 watt output. Usable 3 watt input (5 watt output) to 5 watt input (40 watt output). Guaranteed bandwidth: 138-154 MHz! Maximum DC current: 4 amps at 13.8 Vdc. Dimensions: 1.75x3x4 (HxWxD) inches. SUPER SMALL-fits anywhere! Weight: 8 ounces. I/O connectors: SO-239 (UHF 50 ohm). Automatic carrier operated switching. Reverse polarity protected. VSWR protected. 35 mA constant current charger accessible from front panel mini-rack. Reg. #84.95.

2C030-200 A super battery-saving amplifier designed to operate on your hand-held's low power (battery saving) setting! A full 30 watt output with only 200 mW (0.2 watt) drive. Usable from 50 mW input (10 watt output) to 1 watt input (35 watt output). Protected against accidental input overdrive. Guaranteed bandwidth: 138-154 MHz! Maximum DC current: 4 amps at 13.8 Vdc. Dimensions: 1.75x3x4 (HxWxD) inches. Weight: 10 ounces. I/O connectors: SO-239 (UHF 50 ohm). Automatic carrier operated antenna switching. Reverse polarity protected. VSWR protected. 35 mA constant current charger accessible from front panel jack. Reg. #99.95.

220C020-2 The perfect match for your 220 MHz hand-held. Usable with drive powers from 0.3 watt input (5 watt output) to 5 watt input (35 watt output). Guaranteed bandwidth: 218-227 MHz. Maximum DC current: 3.5 amps at 13.8 Vdc. Dimensions: 1.75x3x4 (HxWxD) inches. Weight: 8 ounces. I/O connectors: SO-239 (UHF 50 ohm). Automatic carrier operated antenna switching. Reverse polarity protection. VSWR protected. Front panel switch allows "barefoot" operation. 35 mA constant current charger accessible from front panel mini jack. Reg. #84.95.

220C040-2 More power for the 220 simplex operator. A full 40 watt output with 2 watt input. Usable from 0.5 watt input (10 watt output) to 5 watt input (50 watt output). Guaranteed bandwidth 218-227 MHz. Maximum DC current: 10 amps at 40 watt output and 13.8 Vdc. Dimensions: 3x7.5x4.5 (HxWxD) inches. Weight: 2.5 lb. I/O connectors: SO-239 (50 ohm UHF). Automatic carrier operated antenna switching. Reverse polarity protection. Front panel on-off switch for "barefoot" operation. VSWR protected. CONTINUOUS DUTY. Reg. #139.95.

450C030-2 A solid 30 watt output from your UHF hand-held! Usable 0.5 watt input (4 watt output) to 4 watt input (40 watt output). Guaranteed bandwidth: 420-470 MHz! Maximum DC current: 7 amps at 30 watt output and 13.8 Vdc. Dimensions: 3x7.5x4.5 (HxWxD) inches. Weight: 2.5 lb. I/O connectors: SO-239 (50 ohm UHF). Automatic carrier operated antenna switching. Reverse polarity protected. Front panel on-off switch for "barefoot" operation. VSWR protected. CONTINUOUS DUTY RATED. Reg. #139.95.

MB30-2 A 2 meter base station amplifier that can double as a mobile amplifier as well! Nominal 2 watt input for 30 watt output. Usable 0.2 watt input (5 watt output) to 5 watt input (40 watt output). Input voltage: 108-125 vac to power supply; 13.8 Vdc to amplifier (provided by power supply during operation). Guaranteed bandwidth: 138-154 MHz. Dimensions: 4.5x7.75x6 (HxWxD) inches. Weight: 4 lbs. I/O connectors: SO-239 (50 ohm UHF). Power supply can deliver 6A regulated. Current limited. Thermally protected. Regulation 0.2% no load to full load. 35 mA constant current charger output (rear terminal strip output) 9.6 Vdc regulated (1A) battery eliminator output (rear terminal strip output). Automatic carrier operated antenna switch. VSWR protected. Reg. #139.95.

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for info about ARRL club meetings, flea markets and other events of interest to section amateurs: 9 P.M. on 146.78 (WB6QGS) and 9:30 P.M. on 145.925 (WA8TCW). Traffic: W6GVBV 316, W6KJZ 117, W6PBI 57, N6JLJ 44, W6ZBJ 24, W6RFF 17, M6W W5BYB 235, W6KJZ 130, W6PBI 121, W6RFF 24, N6JLJ 20.

ROANOKE DIVISION
NORTH CAROLINA: SM, Rae Everhart, K4SWN — SEC: AB4W, STM: K4NLK, BM: K4IWW, SGL: AB4W, PIO: WA4OBR, ACC: K4SWN. Congrats to new section Public Information Officer, WA4OBH and up grades KC4AM N4ETR KB4FPU KB4IHM KB4ERJ. Field Day is over. Did YOU participate? Are YOU better prepared for an emergency? If you answered NO, then more practice and preparation are in order. If you answered YES, then are you registered with ARES or RACES? Do you have authority to operate during a national emergency? Are you a member of a traffic net, or net NCS, or Net Manager? ARRL has lots of free excellent traffic training aids. Interested in station appointments? ARRL membership is a requirement. Radiogram me a request for application form. New appointees: OBS WB4HRR N4BYV; ORS WA4OBR, Lee and Chatham Cos. are organizing an ARES program. K4NV has super satellite station. Amateurs going on vacation, don't broadcast your plans on the air. Lots of ears listening. Thanks WA4FB newswetter. A new idea of the ARRL being closer to the membership is the weekly ARRL net, which meets each Thursday at 8 P.M. on 4411.1 link repeater system. Covers state FB. Tune in or check in. Your comments and ideas are welcomed. Attention all Amateur Extra Class ops: Do you have a large diploma type license issued by FCC district office in Norfolk? Send them a request and a copy of your license. Request yours now before they get out of the exam business. Met lots of League members at FB Raleigh Hamfest. Don't forget the Cary Swapfest July 21 and the League sanctioned Asheville Hamfest July 28-29. The section needs to improve its public service activities. Send me your PSHR reports as well as the station activity reports each month. Summer heat and thunderstorms are upon us. Make sure your amateur equipment and antennas are disconnected. Don't forget the League Insurance Program. Happy vacations and summer fun to all. Traffic: WD4LRG 295, K4NLK 288, WA4OBR 197, WB4HRR 194, WB4WII 175, N4JL 165, K4KJ 139, WB4N 138, WA4MNR 107, N4TK 100, K4JHF 97, K4IWW 88, WA4SRD 85, WA4LZD 57, NE4J 32, K4SWN 26, WB4CYN 20, W4PFR 18.
SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ — What do we do for our Novices and Technicians? Sure, we hold Novice classes and some General classes. But do we encourage them and follow up to be sure they are getting help when they need it? Do we know them well? Do we give them recognition? Do they "get their hands dirty" on Field Day? How about the rest of the year? Is there a "generation gap" that is a turn off? Do they hold offices in our clubs? Since Novices are limited to CW, do we encourage their participation on PSN — maybe an award for most traffic handled on CSN and most clockins on CSN per month? Do we have CW competition at various speeds to help them in preparation for their General code exam? Our Novices and Technicians are Amateur Radio's future, you know, so let's help them and motivate them and give them a sense of belonging and of participating alongside us regardless of the activity. They will forever be grateful to you and be better hams too. Nov. -April: SCSSB 7173/958; SCNT 1575/472; Blue Ridge 10109/462; Greater Pee Dee 5405/668; Anderson 1881/118; Lancaster 623/116; Carolina State Line 304/116. Traffic: K4WJR 245, K4ZL 205, W4HZ 145, W4ANK 122, W4NTO 120, WB4K 96, K4ALRM 69, W4SLUDK 44, W4M4Y 41, K4RFX 26, W4DFJP 18, W4DRF 6.
VIRGINIA: SM, Claude Feigler, W3ATO — STM: WD4ALY, SEC: WB4UHC, ACC: WD4KQJ, OOR/FF: W4HU. Virginia Traffic Net 1 P.M. 7260
Virginia Sideband Net 6 P.M. 3947
Virginia Slow Net 6:30 P.M. 3680
Virginia Net 7:10 P.M. 3680
Virginia Late Net 10:15 P.M. 3947
Make plans now to attend the Roanoke Division Convention at Virginia Beach Sept. 22 and 23. Va. QSO Party winners: Fixed Stn. WA4NTP; High Va. CW Stn. K6R1/4; Mobile Stn. W4APGM; Va. QRP Trophy KW4I; Out-of-State NC2V (N.J.) N4HSH was active with traffic from the Nat'l Elks Home, N4GHI. In total, the PSNRs with 117 stations reporting in with totals over 60. Good to hear that W3BRB is recovering from her recent illness. Richmond and Williamsburg ARES groups were active with the Lion's Bike-A-Thon. N4EXQ upgraded to Advanced. AA4AT back on ftc nets after Fla. trip. WA4CCK very busy as mgr. 4FN cycle 2. WB4PNY active with 2-meter HT. W4HU KE4EQ and WB4J are active with OO monitoring. I hear that W4NTG K4KWI WA4RBC and WB4SHK are active with Packet repeater. K4JST has plans to try Amtor and is about ready to go. It is good to hear the many ARES training nets operating on the Tidewater 2-meter repeaters with liaison to the NTS nets. W44RTS is now the DEC for the Lynchburg area. Traffic totals for the month 1777 and 457 stations reported. Traffic: N4GHI 688, WA4CCK 688, AA4AT 354, W3ATQ 343, K4KDJ 250, WD4ALY 245, WD4OCW 235, N4EXQ 225, WD4FTK 221, K4DTE 205, KR4V 184, K4JST 173, WB4PNY 140, K4JUM 122, K4VWK 72, K4JUM 70, WB4FLT 68, WB2OMZ 69, KB4WT 58, WB4EDB 47, K4MLC 44, K4GR 37, WB4ZNB 38, WB4K1 35, W4JLS 33, NT4S 30, K4AJXZ 28, WB4RDV 27, K4AZT 27, WB4UHC 26, N6ANQ 24, KB4PW 22, N4I 20, N4TE 18, W4LXB 15, WB4DQZ 10, W4PVA 10, N4FNT 7, K4LMB 5, W4ATVS 4, N3RC 3, W4YE 3, N4LE 2, W4XC 1, W4TZC 1.
WEST VIRGINIA: SM, Karl S. Thompson, KBKT — SEC: K8QEW, STM: K8BG, ACC: W8BCTO, SGL: KB8S, TC: K8CG. Thirty eight persons attended LPM '84 in S. Ches on 4/12 & 4/13. A meeting was both productive and enjoyable. K8BSWA is now K8BRD; congrats on good work on the WYNN newsletter. Sorry to report that W8BLA and W8BRD are Silent Keys. W8DAIL is active on WVN. Net
Freq. Time QNI QTC Sess. Mgr.
WVNN 3730 6:15 198 71 30 K8BRD
WVFN 3900 6:00 607 102 30 N8AJC
WVMD 7235 11:45 798 95 30 W8FZV
WVN 3567 7:00 247 84 30 W8LYP
Hillbilly 14280 Noon Sn 135 18 5 K8BYU
KARC 2M 28/88 8:30 Sn 100 3 5 W8BAEW
Traffic: W8BDY 328, K2BG 169, N8EMQ 163, W4JN1 123, W8P 112, K8OCGF 62, K8RG 60, KBKT 43, W8FZP 41, WBHZA 37, K8QEW 34, W8AKCJ 33, N8AJC 31, W8DAIL 8.

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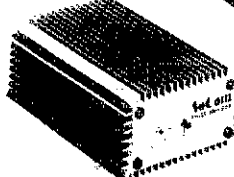


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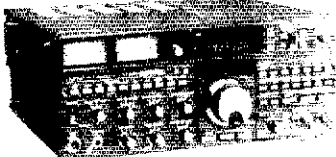
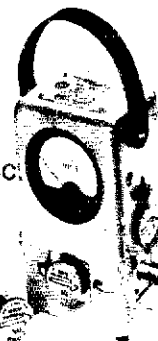
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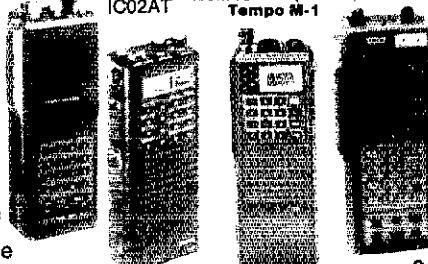
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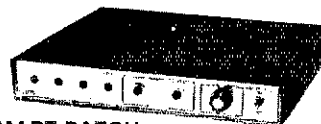
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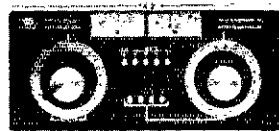
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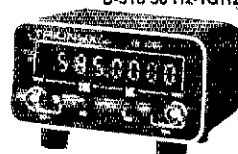
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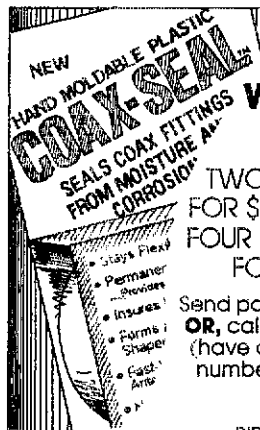
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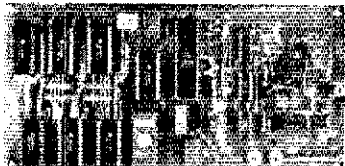
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Slope. ECs are trying to help, it is going as well as can be expected at this time. Many happenings for this issue. WDBAIT announced two new apps, asst Traffic Mgrs for the E. Slope, KB02 & for the W. Slope, N0CX1. WDBAIT is also organizing a 2-meter traffic net. He needs help, so contact him if you can help or make any suggestions. Coming events: Mountain ARC Swap & Campout at Red Rocks July 7-8. RMFL Field Day & Picnic on Guy Hill July 15th. The infamous Columbine picnic July 21 in Dillon, Ski Country Hamfest at Glenwood Springs July 28, this event includes a quarterly meeting of C-150 of fun. Very eastern slope caravan will be going over for a weekend of fun. Very sorry to hear of Silent Key, N0CXE, a very active YL amateur & president of WSARC. She will be missed. Name droppers: WNBWRWG for coordinating March of Dimes Walkathon, KOOP, great radio school this year, KA6NPG, reorganization of QAZ. Congrats to DRC, our newest Special Service Club. Nets: CWN QNI 151, QTC 101, time 601, 28 sess.; HNN QNI 1758, QTC 84, inf 346, time 1411, 30 sess.; CVXN QNI 2786, QTC 2957, time 2700, 30 sess.; Col no totals. Traffic: WA8LJZ 2132, N0BQP 1681, K6JAN 572, K6BYK 379, K6BZ 165, W6EJD 146, W0D8SZ 122, WDBAIT 58, W0BNIH 56, N8EEM 48, W0NFW 40, W0LAE 38, W5HRS 30, W0LQ 13, N8CYR 1.

NEW MEXICO: SM, Joe T. Knight, W5PDU — DEC: K85XK, STM: KVSU. NMs: WA6UNO K6LL W5VFO. TC: W8GY. ACC: W5HD. Southwest Net (SWN) meets daily on 7083 at 1930 local and handled 203 msg with 227 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 119 msg with 1094 stations in. New Mexico Breakfast Club meets daily on 3939 at 0630 local and handled 87 msg with 958 stations in. Yucca 2-Mtr Net 78/18 & 93/33 handled 10 msg with 425 checkins. Caravan Club 2-Mtr Net 66/06 handled 8 msg with 160 checkins. SCAT 2-Mtr Net 66/06 handled 2 msg with 480 checkins. W5QNT had a serious heart attack, but is holding his own at the Deming Hospital. The Bean Feed was a huge success with about 50 present. Traffic: W5DAD 242, W5ENI 91, W5JVO 87, N5EXC 2.

UTAH: SM, Ron Todd, K3FR — STM: W7OCX. SEC: N47G, BM: WA7MEL. OORFI: K07FL, ACC: K87XO, PIO: N7BHC, TC: K7FJ. Sorry to report W7KZF is now SK. WB7UGR awarded 1983 Utah Ham of the Year" posthumously. Remember, safety first as you erect your new antennas for the coming contest and DX season. Hope to see some stepped up participation in the contests this year. Flood and mud season is starting; Davis, San Pete and Utah Cos. have seen some activity but none that has required major ARES participation to date. Glad to see enthusiastic sign-up campaign in Salt Lake Co. for ARES. Hope that the initial interest keeps building and remains strong as time marches on. UARC has a new club homebrew project. W7ARK's real intent is to build excitement and interest in Bunny Hunts. Maybe we can get some interesting competition going. If you haven't planned on attending WIMU, now is the time to gas up and get moving. See you in Jackson, WY Aug. 3-5. Traffic: WA7KHE 112, WA7MEL 65, W7RO 12, W7OCX 6.

WYOMING: SM, Dick Wunder, WA7WFC — SEC: W7TVK, STM: W8QGH. I would like to thank K7QJ for his fine efforts as PIO & ACC, and wish him the best with his new assignment in Colorado. As you noticed above, there are numerous leadership official appointments open and your help is needed in making YOUR section run smoothly and benefit us all. Please contact me for information. Don't forget to attend the hamfests this summer as they are going to be very good. WA6P7J reports the WYO Jackalope Net held 25 sessions with 581 QNI & 0 QTC. K7CFJ reports the WYO Cowboy Net held 21 sessions with 358 QNI & 17 QTC. Traffic: WB7NHR 362, W7HLA 48, K7SLM 12, W7SQT 8.

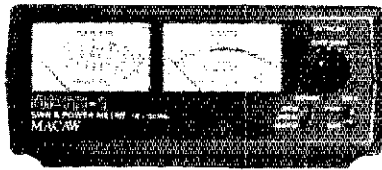
SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, WA4PNO — SEC: N4DMA, STM: N4JAW, SGL: KA4WVU. PIO: W04W, BM: KF4VV, OORFI: K4ELY. The tornado season came in with a bang and my congratulations to all those who worked with such diligent dispatch to calm the day and efficiently produce the positive results that were needed. The B'ham AM RC has been added to the list of Special Service Clubs in the section. We have a new emergency coordinator for Lee Co., Gene Gibbs, KA4TNG. Tnx to Bob Wade, K4KCT, for the good work in the past. If you are active in handling written traffic, then you may be eligible for a field appointment as an "Official Relay Station." Let me know. There is also an appointment for stations with full backup power capability if you qualify for "Official Emergency Station" status. Let me know. KE4WJ, ex-WA4LFR, Arnold C. Campbell of B'ham, has joined the Silent Keys. Nets: CAND reports 158 messages in 30 sessions with DRNS 129, 100%, by W6CKS and WX4I. DRNS reports 944 messages in 60 sessions with N44X/W4JWF WX4I/WX4JH/WX4JDH/WX4CS/WX4CS/WX4CS. BFL: WA4JDH/PSHR: W40CKS/WA4LX/KB4GPN/WA4JDH/WX4I/WA4RNP. Traffic: WA4JDH 940, W4CKS 102, WB4IXA 97, WX4I 92, N44X 84, WA4LX 53, K4AOZ 38, KB4GN 35, WA4RNP 28, KC4GS 26, N4JAW 24, W4WJF 10, WB4TVY 8, W4DGH 7, WA4PJE 2.

GEORGIA: SM, Eddy Kosobucki, K4JNL — SEC: WB4ABY, STM & OORFI: K4VHC, ACC: WA4ABY, BM: W4BIA, PIO: WA4PNY, SGL: WA4BTZ, TC: K4UDR, NWS: WA4PZD. Congrats are in order to those who participated in the state & local nets during all the WX emergencies during April & the 1st part of May. This is the reason the hobby exists. "Public Service" during the last 3 months, my on call air activities led me to the work I asked I had. I will be on more often now that I'm back on a normal work schedule. KF4EH invites all to Madison on the 7th of July for the annual GA SSB Assn Picnic. If you've never been there, U have been missing one real good time. This is a family affair so bringing them will let U off the hook for the next hamfest. The next weekend following the picnic is the Rossville Hamfest. Take the family and enjoy the cool mountain air. I did not attend the Albany Hamfest owing to work, but I have been told that all who attended had a FB time. That Albany gang really put out the efforts as they promised they would. If U have a member of your local club who needs to be recognized for a real good reason please let me know by mail only so that we can take the necessary steps to see that his or her name is given a Merit Award. I know that there are many in the section who qualify so please let me know who they are. The second annual Confederate Signal Corps Hamfest is on scheduled for Aug. 25 & 26. The place is the Holiday Inn at Madison. Agn U can bring the family. For motel reservations, contact Bob Wilbanks, WB4ZVX, for a weekend of fun. They promise U a FB time. Next month I will list the areas in the section in which we need ECs. The section is pretty well covered, tnx to our very capable SEC, WB4ABY, but we still need a few more. Tnx to all of U in the section for the real support, constantly give me.
NORTHERN FLORIDA: SM, Billy Williams, N4UF — Those who worked diligently to make December a big traffic

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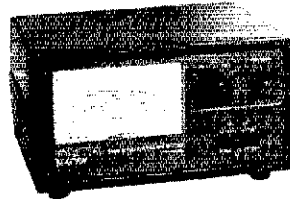
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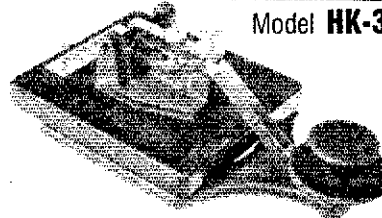
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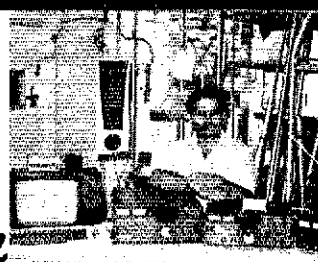
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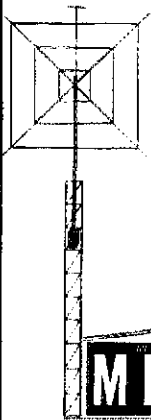
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month will be pleased to know that the SAR totals which were "missed" in QST have been credited to the section. NOAA has been named as Chairman of the NE Fla American Red Cross which is one of the larger chapters. GCARC had a nice turnout for the Chasco Parade and the April program was presented by FADCA, the digital communications group. A group of Dade City and Traveler's Rest radio hams provided public service comm. for a 10K race. The new 28/88 Dade City repeater was used with good results. The Florida QSO Party had a nice turnout and quite a bit of activity despite bad bands and a solar flare which blew out the bands for almost two hours. WA4B NF4L, N4GBY and WD4ITK went mobile and activated over a dozen counties. The Lehigh Acres group activated rare Glades Co. Tnx to W4IPT for a great job as FQSQP chairman. We look for an even bigger one in 1985. N4HRZ is sponsoring a ham club at Rock Lake Middle School. He thanks members of LMARS and OARC for equipment donations and more are needed. W4WKQ received an award for working over 2500 stations with 10-10 numbers. The Gulf Coast VHF Traffic Net is now a local NTS net. Mgr. is K4VND. Congrats. The Greater Jax Hamfest and Northern Florida ARRL Convention are set for August 1st and 5th at the Orange Park Kennel Club. Traffic: N4PT, W4FAK 711, W4ADL 507, WD4IO 466, WB4GHU 345, WD4HB 327, W4CAVK 322, WA4QXT 273, WX4J 268, KB9LT 220, WA4EYU 182, N4GMU 167, KB4LB 150, WB4TZR 146, WD4IU 140, NF4O 114, N4EDH 110, W4MGO 108, NY4E 105, KF4U 105, K4VND 98, WD4MLQ 62, KD4KK 59, N2AMG 58, N4AF 57, WB4YQP 57, WD4EQB 82, N4J4Q 45, N4ADI 38, NS4C 33, NQ4P 30, KC4FL 36, WD4HUZ 22, WB4AWG 20, W4DVT 20, N4JH1 20, KD4GZ 19, K14CQ 19, KA4ETX 19, N4HP 18, KV4HI 10, KF4YG 8, W4LUW 8, WB4FJY 6, WA4PUB 6, W8IM 4, N4JLJ 2, KA4RBY 2.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC. W4SS, STM, K4ZK, TC, K4AT, BM, WA4EIC, ACC. AA4W, PIC, W4WYR, SGL, KC4N, CO4RFI, W4SS. WA4EIC reports 124 bulletins received and sent by WA4EIC 30, AA4BN 10, W4DL 36, K4IEK 8, W4TF 28, and WD4KBW 12. OO station reporting: N2VX. Now that W4SS is OO/RFI coordinator, OO reports should now be directed to him for forwarding to Hq. W4IYT reports that K4IWT was manned by 33 operators for 17-18 days for the Youth Fair in Dade Co. WB4RZW as the fair coordinator this year, congrats on a job well done. W4DUG was again active as a result of a club exhibit at the Girl Scout Extravaganza at the state fair grounds April 7 and 8. WB2OUK sent a message stating that the Lehigh Acres ARC was operating in the Florida QSO Party under call KA8GXQ. The Dade Emergency Net operated two of their sessions simultaneously on two repeaters according to the manager K4AAX. A note in the Fort Myers ARC Modulator states that a RTTY net has been started on 146.005 meeting every Thursday at 7 P.M. AA4MI reports he is acting as liaison for the Brevard RA and also is active with the public service event station W4NLX. The IRARC and Brevard RA Association send out their newsletters together and are much appreciated. The Florida Amateur Digital Communications Assn. in Brandon is publishing a very fine newsletter also. W4DVO says the years are flying by when he sent his OPS certificate in for endorsement. W4LLA made 47 phone patches during the month. N4KB had his first FCC sig in April — W4IYM will be handling it until late November. W4UJO has QSO'd with 1600 stations this summer. WB4FOM finally got his problem with his ham auto tag license straightened out — the agency in PB Co. at first denied him renewal because they didn't understand the difference between an amateur radio operator and the now defunct CB. W4RH also reports that there has been no change in the cost of a ham tag; again it is apparently a lack of information in these agencies. 73 de WA4PFK. Traffic: W3CUL 3275, W4DUG 934, W3VR 854, K4IWT 602, WA4PFK 396, AF3S 310, K4SCL 294, K4EUK 291, K4AGLUS 272, WA4EIC 256, W4NFK 244, WB4NYG 240, WB2NVJ 212, W4PKP 135, W4FID 120, K4FCS 116, K4ZK 116, W4LLA 114, W4YCL 109, WB2ZY 107, W4ADL 89, W44XUJ 82, K4JA 92, KF4RL 78, KA4NXF 67, W4DVO 64, KA4FZI 63, K4AJA 62, WA4TWD 62, WA4ES 59, WD4CHO 56, KB4KB 55, K4RWV 47, WD4KBW 46, W4WYR 44, W4TF 38, WB4GCK 38, K4JL 38, AA4BN 35, K5IHH 34, NJ4D 33, KA4KDB 32, W3TLV 30, W4IYT 26, K4JLL 24, KA4YHS 21, KA4BBA 18, K9EHP 16, N4KB 16, W3JJR 13, WK4F 12, WB4HYB 11, WD9AEP 10, K8BXT 10, K7LCA 10, WB2OUK 10, W4UJO 10, KF4AX 8, N4FLG 8, KA4SIH 8, AA4WJ 8, K49AKY 6, W4V4 6, N4AKA 6, N4AKA 6, WA4NBE 6, N4EVD 5, KA4GDU 5, W4IUC 5, W4MFD 5, K4I4L 4, WD4MCC 4, W4MPV 4, K4OCV 4, N4IVG 2, WB8SNT 2, K4Y2 (Mar.) W4NFK 1, N5FY 1, (Feb.) N2WX 19, (Jan.) N2WX 33.

WEST INDIES: SM, Gregorio Nieves, KP4EW — West Indies Net Slow (WINS), daily 7 P.M. (2300 UTC) on 3.710 MHz. West Indies Net Central (WINC), daily 6:30 P.M. (2230 UTC). West Indies Net Borinquen (WINB) on 3.930 MHz. LSB 2230 UTC. The PRARC celebrated a 3-day min-hamfest at the Humacao Beach Resort with the capacity of the 25 resort cabins full of amateurs and their families. It was a very successful one including conferences, including a medical one and another with the FCC Field Engineer in Charge for Puerto Rico, William Bery. Congrats. On the 24th of February 1983 at 0825 UTC the first known contact in the island on the 1750-meter band was made between KP4CA and KP4GC, the latter using callign 4J4R and KP4CA using callign 4CA. The frequency of the transmitting equipment was 78 kHz. Both the antennas and equipment were home made. The length of antennas was 15 meters with loading coils of 15 millihenrys. The maximum input power was only 1 watt. Both operators claim this is the first QSO known in this experimental band, authorized by the FCC for Puerto Rican operators. KP4DJ reports the following totals for WINS: QTR 365, QNI 92, QTC 39, 29 sessions. Traffic: KP4DJ 79.

SOUTHWESTERN DIVISION
ARIZONA: SM, Erich J. Holzer, N7EH — STM, W7EP, NM's: WA7KQE, WA7FDN, AGC, N7ECE. The Superstition ARC reports that they helped provide comm. for a telephone outage that resulted when the rain finally came in early April. The Mingus Mt. RG and ARA helped with comm. for the 1984 March of Dimes Walk-America. Those participating were WA7VWG, W7GWG, N7AUW, WB8TIX, K7TPW, K7DSR, W7QQB, N7DOR, W3KMD, K7NEM, N7ETP, N7AYI, K7MLJ, W47PMS, W47DXQ, W2MUH, WB7ASR, N7GCE, K7PMS, W7GFE, and N7BHY. Air Fair 84 saw the following Scottsdale ARC members provide comm: W7B, K7FW, K7POF, WB8IBZ, N7FVQ, KB7CH, W7B, K7BTB, WB7BE, K7WJD. The Green Valley ARC reports their members who helped with comm. at the 4th Annual Garder and Patio Tour were: W7FVY, KB7KQ, W7ROD, K4DHC, K7EVH, K7EDJ, KX7J, W8SXU, W2RVS, K7KOR, K2CVT, W3BXI, N8CHY, W8CFX, W7LTA, K7LKU, WB7ORC, W7HR. The following members of the AVRA

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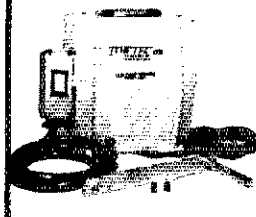
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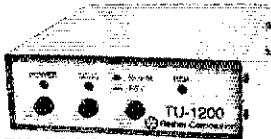
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ORANGE: SM, Sandra Heyler WA6WZN — SEC: WB6UQ. STM: WA6GCA. ACC: W6BNLY. COPIFI: WB6DXI. Coord: N6PE. PIO: NS6W. SGL: N6HJO. TC: A6DD. DeCa (by counties): WB6JBI (Orange); W6LKN (Riverside); WA6IKH (San Bernardino); KA8HII (Inyo). Lake Eisenhower Valley ARC now meets at the Community Center, still on the 2nd Thurs. They have club breakfast the 1st & 3rd Sat.; WA6TIJ is their new v.p. West Coast ARC repeater N66B/FI is now coordinated on 146.745 (-6) PL 4Z (136.5 Hz). Victor Valley ARC held successful T-hunt; also, EC WA6OFT held ARES/RACES meeting to discuss VIP program of CDF that included WA6IKH WB6FNG KA6IKU WB6FOI K6BET & WB6UQ. Morongo Basic ARC supported Lions and other public events. Thanks to KA6EHK KA6ES KA6KOB WB6FKY WA6OFT WA6SA W6MXF WB6PAH & WB6OQ. WB6JBI will head up the ARES comm for the Olympics in Orange Co. Current Orange Co. Area Coordinator for Southern Calif Contest Club is N6W. Southern Calif ATV Club reports WA6SVT/R on Santiago Peak is back in operation with both 434 MHz and 426.25 MHz inputs. Owing to the resignation of WA6WZO, N6VI was elected by the board as the new v.p. for So Ca DX Club. Orange Co. ARC (W6ZF) current nets: Sun 8 P.M. 21.75 MHz CW, Tues 7 P.M. 28.775 MHz (SSB) and Wed 9 P.M. 146.55 MHz simplex. AEC K6BET reported Cancer Bkathon support for Apple Valley by N6GIG N6HFA KF6JLJ WD6CHR N6HDO N6HFR K6P5 KA6OAS KA6LLO K6EPS KA6OLD WB6LC WA6OFT K6BET. Anaheim ARA sponsors a new computer net Thurs 8 P.M. on their repeater K6K/R 146.79 (-8). Huntington Beach RACES officer K6KQ reports ham booth at Golden West College Health Fair manned by N6AQC K6FZB KA6PFB N6GVO KF6VV KA6YGV. KA6GJP needs support for new Novice Net held 0230Z daily on 3740 kHz. Ham booth at Orange Co. Fair (July 6-15) sponsored by OC Council of AR Organizations is being headed up by OC ARC; for info contact KA6IMP or W6IBR. PSHR: W6NTN KA6BNW WB6QBZ WA6QCA AIG6 KA6HJK/T.

Net	Freq	Time	QNI	QTC	NM
SCN1(20+)	3538	7 PM	382	371	AIG6
SCN2(13)	3538	8 PM	382	113	AIG6
SCN1(FM)	146.645	9 PM	509	355	WA6QCA
RTTY(VHF)	145.12	9 AM	457	94	KA8HJK

Traffic: WB6BZ 168, KA6HJK 164, WA6QCA 135, AIG6 131, KA6BNW 80, W6NTN 77, N6GOT 72, W6RE 69, ADPA 62, K6GGS 60, N6GIW 39, K6ZCE 29, WB6NS 12, W6TKV 5.

SAN DIEGO: SM, Arthur R. Smith, W6INI — ACC: WA6COE. TC: N6NR. BM: WA6HJ. STM: N6GW. SEC: W6INI. PIO: WA6CUP. Each club is entitled to nominate a Public Information Asst for appointment by the Section Manager. Appointment is for a two-year term (renewable). Must be an ARRL member. Contact WA6CUP (435-3123) for info. This column is intended to publicize what section members and clubs do. To do this, I need input! Mail a postal card, or CD-210 (Station Activity Report) to reach me by the 5th of month with info. CD-210s available for \$4.50 from ARRL (see page 8). Convair ARC joined with ARES to provide communications for the Conroy Bike Race. K6GJP was coordinator. Twenty ARES members, coordinated by KM6S, supported the March of Dimes walkathon. Convair ARC is first in section to qualify for Special Service Club status. Other interested clubs should contact Affiliated Club Coordinator WA6COE, 464-1744. Santee Swap Meet ends on Sept. 1, owing to lease termination. San Diego AR Council has applied for VEC for Calif. No. County Tlc Net met 29 times and handled 133 msgs. Traffic: K16A 569, W6HJLJ 271, KJ6D 258, KM6I 104, N6AT 58, KF6F1 48, N6GW 32, WA6IK 6.

SANTA BARBARA: SM, Ernest L. Kapphahn, WB6HJW — March of Dimes walk was supported in SLO No. County on April 28 by W6SGC K6RF (439) and N77U. Communications were provided for the Conroy Bike Race by KA6VRW W6ZZN WB6HDB N6JMI and KE6LO. Conroy Valley ARC reports that its club station, WA6IAX, is back on the air. Besides CVARC and Satellite AC (W6AB), are there any other operational club stations in the section? Registration flyers are now available for the SW Division ARRL Convention to be held in Santa Maria, Oct. 12-14. If you have not received a flyer, you may request one by dropping a card to: Registration, Hamcon, Box 2457, Santa Maria 93455. April traffic picked up on SCN/SSB with 85 messages handled and 258 check-ins. Make your presence known by checking in nightly at 9 P.M. on WB6RDV/R 145.18 MHz. Many arrivals in the section should be busy this month manning the station set up in the Olympic Village at UCSB. The station should be active 12 hrs a day during the Olympics. Even if you are not going to operate in the Village, you can participate by assisting in getting the traffic out. Contact N6AJA for info. With a dry summer ahead, and fires already in early May as this is being written, many amateurs in the section are participating in V.I.P. programs with Calif. Div. of Forestry. If you would like to take part in these fire watches, contact your local EC or the nearest CDF office to learn if the VIP program exists in your community. PSHR: K6YD KA6OCT N6FOU. Traffic: K6YD 170, N6FOU 44, KA6OCT 28, K6ZM 10.

WEST GULF DIVISION
NORTHERN TEXAS: SM, Phil Clements, K5PC — ASM/ACC: N15V. SEC: W5GPO. STM: W5WPM. PIO: N5FDL. COPIFI: W55JBP. SGL: W5UXP. TC: W55IR. BM: W5QXK. On May 1st at 9 P.M., a tornado struck the city of Matador in Motley Co. Eighty seven homes were damaged, 27 of which were destroyed; including the high school and a church. Power was partially restored by 11 P.M., and W5BEY joined the emergency session of the Texas Tlc. Net on 3943 kHz with WA5BXH as NCS. WA5RWW, District #2 DEC arrived in Matador by midnight, followed shortly by SEC W5GPO. W5BEY, W5GPO, WA5RWW and K5PC set up an HF station at the EOC in the fire station which was operational by 2:30 A.M. on May 2nd. The sheriff had set up a curfew and roadblocks around the disaster area, and would not allow us or the Red Cross Disaster Team into the area until 8 A.M. Again, the Texas Tlc. Net went into special session from 8-9 A.M. with WA5BXH as NCS. The operation was moved at 9 A.M. to the 7290 Tlc. Net on 40 meters, with K5JN as NCS. This net remained in session throughout the day until the operation was terminated at 7 P.M. Some 50 health and

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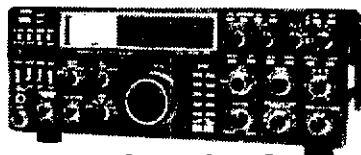


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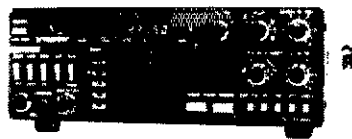
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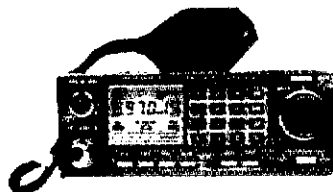
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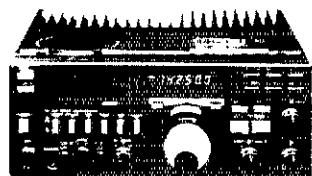


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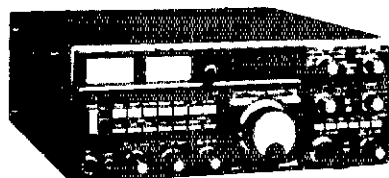
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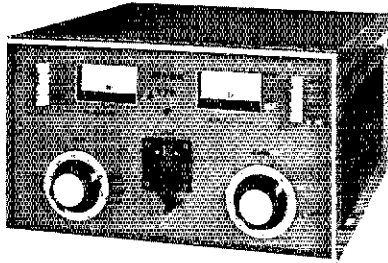
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welfare messages were serviced during the operation, with replies coming almost instantaneously, thanks to the outstanding service conducted by the Red Cross Disaster Team out of Lubbock and Plainview. W5GPO and K5PC were relieved at 2:30 P.M. by the Childress Co. ARES group, led by EC N5CAN, for the remainder of the operation. We all learn by experience, and this operation was no exception. Band conditions were terrible, and Matador is far removed from repeater coverage. During the next few years, it will be imperative for units responding to disasters to prepare for the worst conditions; dipole antennas and possibly amplifiers will be necessary to maintain usable circuits. The nets will need much help from relay stations. Please monitor 3943 (night) and 7290 (day) during disaster operations and help with QSP when conditions are bad. Our heartfelt thanks to the members of the 7290 Tfc Net for making this operation a success under severe propagation conditions. We need more teams in our section to respond to these communications emergencies. Contact either W5GPO or me for details on how to organize a team in your area. Congrats to W5BJ for winning the Charles Gore Award for many years of public service work. PSHP, KA5AZK, N5BT, KD5FR, KA5LOA, N5GKF, N5FDL, N5EZM, KA5QWN, Traffic: KA5AZK 201, KD5RC 165, N5BT 156, W5OXE 124, KA5QWN 116, KD5FR 78, W9OYL 67, KA5LOA 34, AE5I 32, N5GRZ 31, W5ERT 15, KA5SPT 10, N5EZM 8, N5GKF 7, N5FDL 7, K5PC 7, K5SUL 2.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR — SEC; open. STM: K5QEW, ASM: N5TC, OO WA2VJL, newly appointed under new system, has new FT-757GX and Bearcat Scanner; busy in South Texas Emergency Net with election to offices in two separate zones. OO K5VRF has completed RTTY setup with back-up 51S1 receiver and AMTOR upgrade. COBS W55FCO has posted 9 ARRL bulletins, 4 propagation forecasts and 4 CRRL bulletins on the Austin Armadillo computer bulletin board. W55WPS has announced a new net, The Hispanic Amateur Radio Society Net, which meets on Sundays at 1830 UTC on 7265 kHz; ops from U.S. and Mexico join in the fun. N5EFG sends computer generated code practice at 8, 11 and 14 wpm three times a week at 7:30 P.M. on 3745 kHz, just ahead of the Texas Slow Speed Net. GAND Mgr W5KLV reports South Texas represented RNS 100% by W5KLV, N5AMH, W5YDD, N5DFO, KD5KQ, N5EFG, W5SHN and KA5NCT. OBS W5KLV gave 6 ARRL bulletins, 4 DX bulletins, 3 CRRL bulletins, 29 satellite bulletins and 5 propagation forecasts 119 readings on 7 nets. OBS N5DFO broadcast 6 ARRL bulletins, 3 CRRL bulletins, 9 satellite bulletins, 4 DX bulletins and 5 propagation forecasts on 8 nets. DRNS Mgr W5YDD reports South Texas represented 100% by W5KLV, W5GTT, N5DFO, KD5KQ, W5URW, K55V, N5EFG, K5WOB, W55ATP, W5YDD. K5GM reports RTTY program proceeding nicely. The 7290 Net/Texas CW Net/Texas Slow Speed Net picnic at Kerrville had great attendance. South Texas Emergency Net (STEN) Convention in Flatonia was quite a success; NQBE elected NCS (president). Traffic: W5CTZ 579, W5YDD 502, N5DFO 358, W5KLV 337, W5SHN 288, K5GM 172, W5TFB 114, K55V 97, N5TC 62, K5HZR 37, W5GKH 32, W5KR 29, WA2VJL 29, KV5W 21, W5BGE 19.

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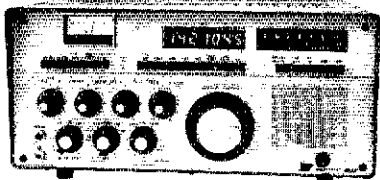
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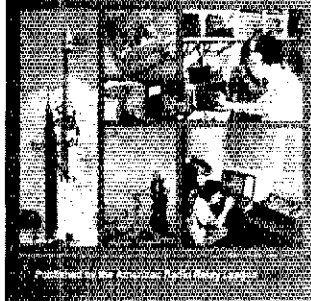
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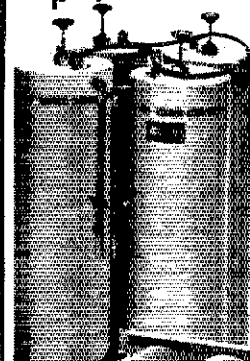
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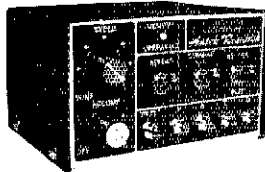
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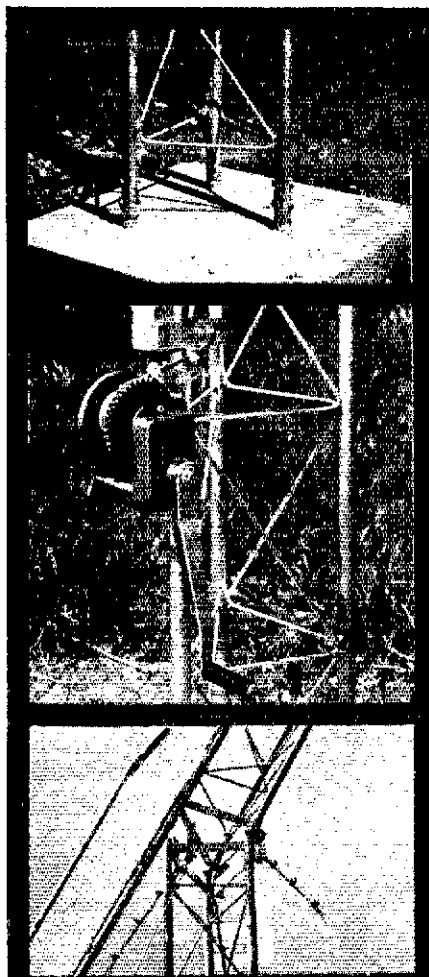
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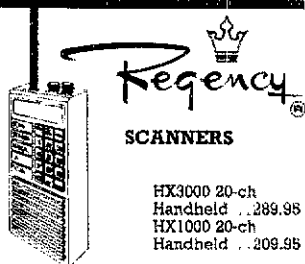
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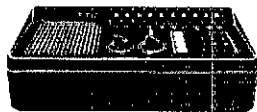
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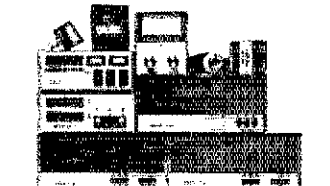
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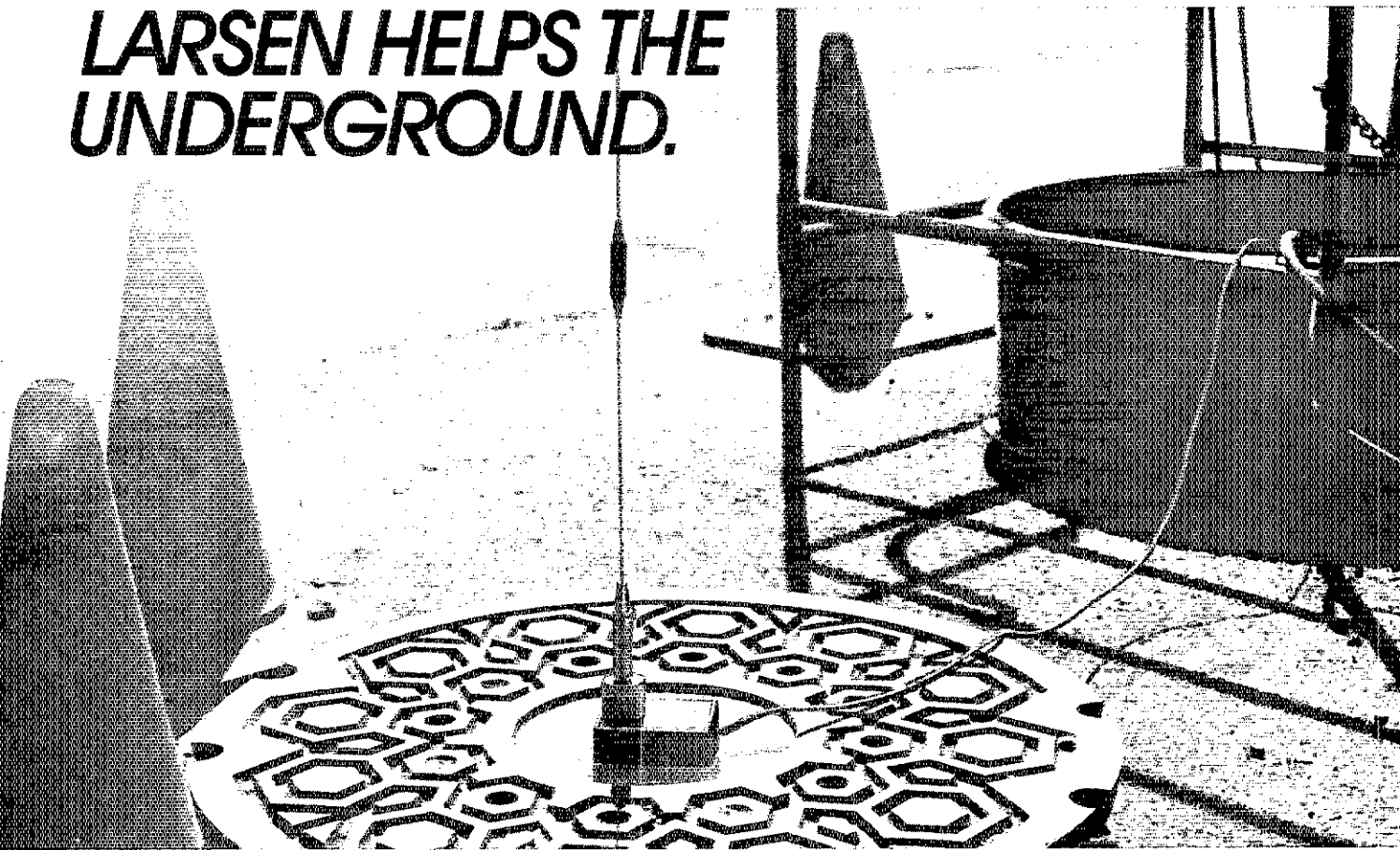
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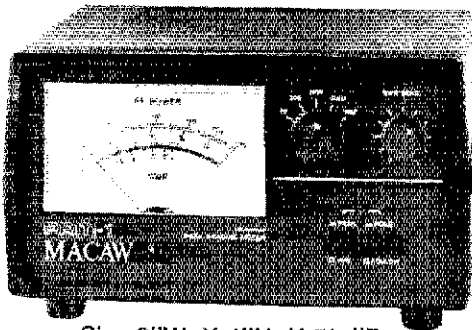
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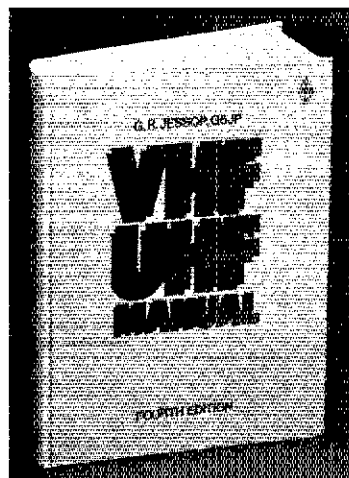
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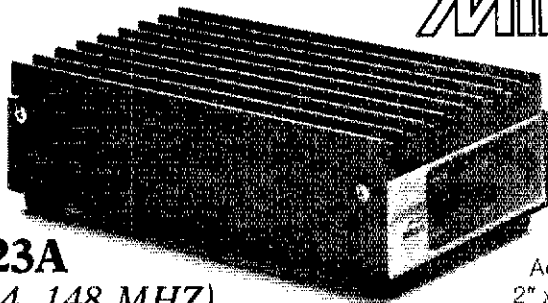
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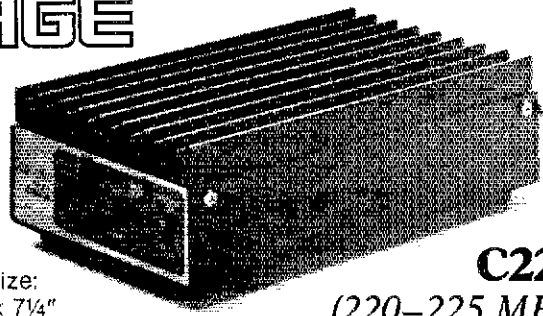
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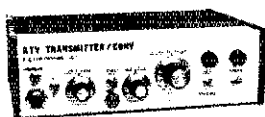


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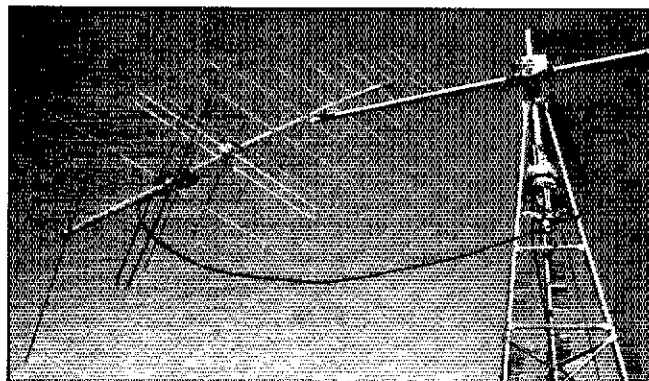
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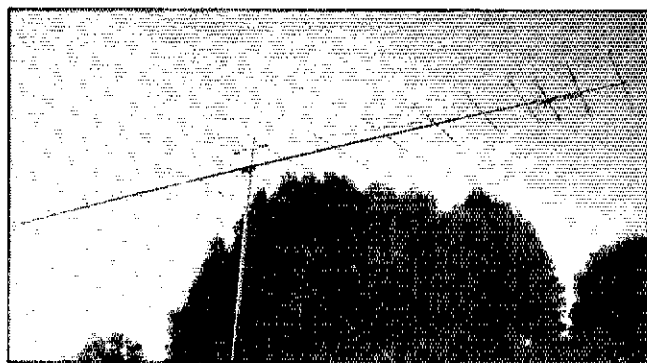
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2M-22C

BANDWIDTH	144-148 MHz
*GAIN	
BEAMWIDTH	(E) 32°, (H) 32°
FEED IMP	50 ohms unbal.
BALUN	(2) 4:1 coaxial
BOOM LENGTH	19 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	1.85 sq. ft. max.
ELLIPTICITY	± 1.5 dB max.
CIRCULARITY SWITCHER	CS-3 included
WT. (lbs.)	11 lbs.

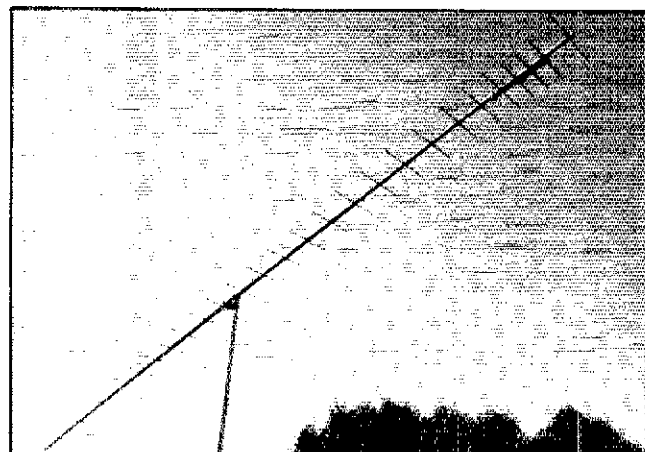


2M-16LBX

BANDWIDTH	144-146 MHz
*GAIN	(144 MHz)
BEAMWIDTH	(E) 26°, (H) 29°
FEED IMP	50 ohms unbal.
BALUN	4:1 coaxial, 2 KWPEP
BOOM LENGTH	28 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	(H) 1.75 sq. ft. (V) 2.44 sq. ft. max.
WT. (lbs.)	10 lbs.
TURNING RADIUS	15 ft. 5 in.

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432-30LBX

BANDWIDTH	430-440 MHz
*GAIN	
BEAMWIDTH	(E) 19°, (H) 20°
FEED IMP	50 ohms unbal.
BALUN	included
BOOM LENGTH	21 ft. 11 in.
F/B	F/S
VSWR	1.5:1
WINDLOAD	1.71 sq. ft. (max.)
TURNING RADIUS	12 ft. 4 in.
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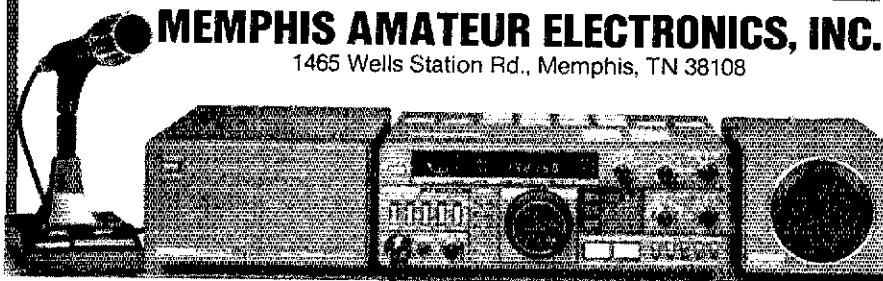
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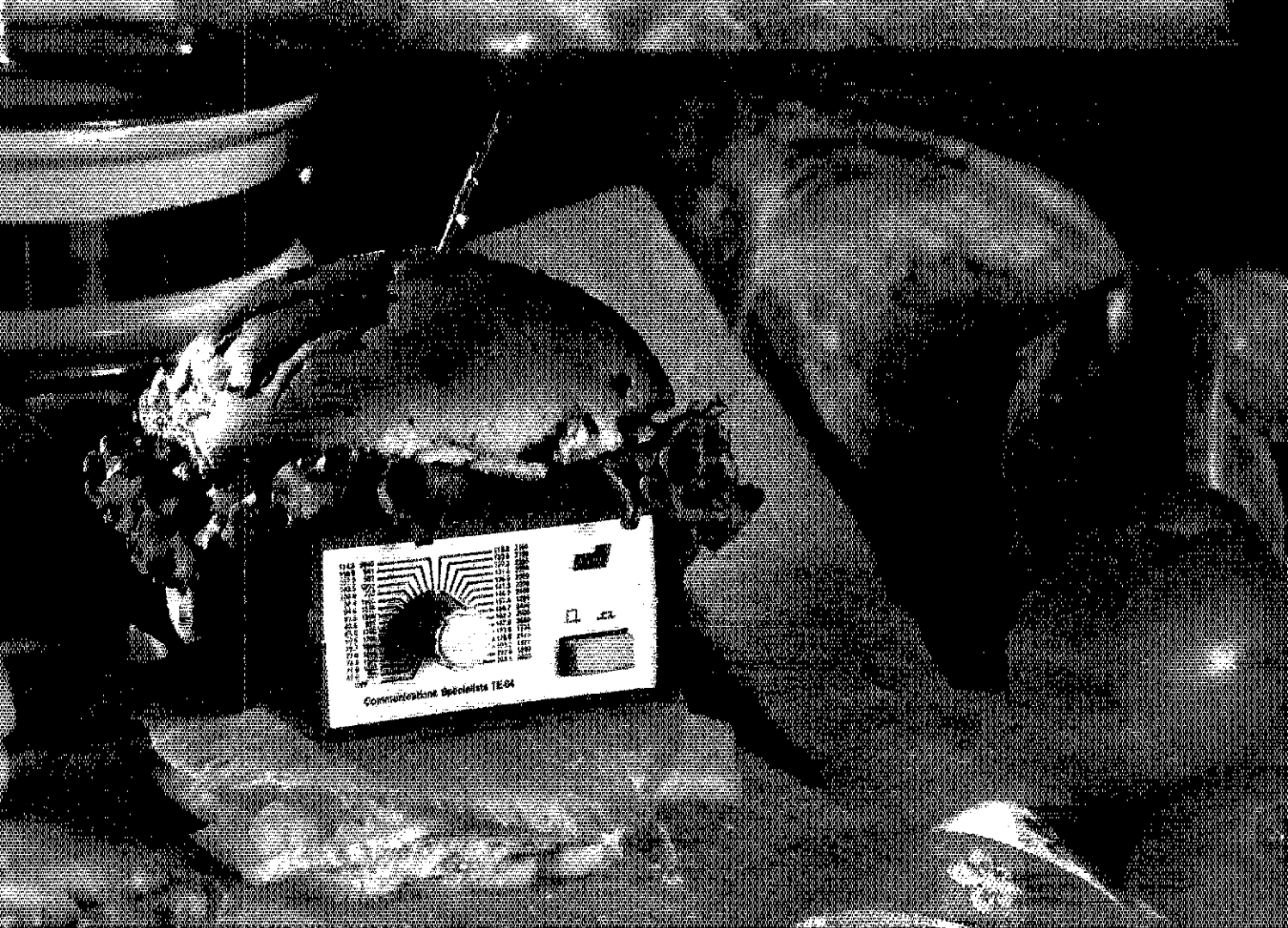
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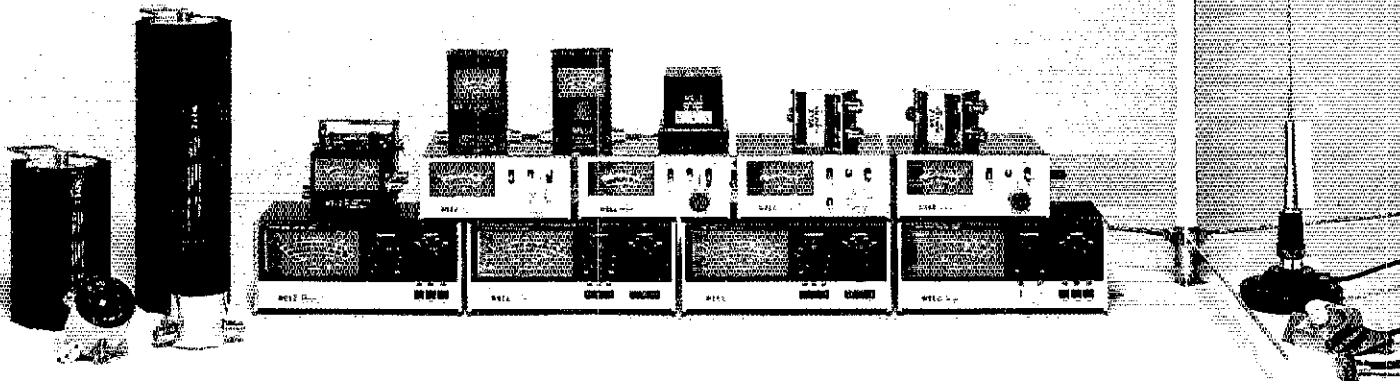


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 220 MHz—FM-4033

The KDK FM-2033 represents a significant advance in user convenience and simplicity of operation for the user. The KDK '33' series provides excellent readability in any lighting condition for the operating frequency and the memory channel in use. Warm orange background LCD displays improve readability by providing easy-on-the-eyes contrast.

Simplicity of operation has always been the mark of the KDK design team and the FM-2033 is no exception. From the single knob frequency and memory selection to the automatic recall from memory of the desired repeater offset, the FM-2033 provides relaxed, comfortable mobile operation.

Once the 10 memory frequencies have been selected, a single knob is all that is required for operation on the standard simplex or repeater channels. Using the audible beep as the end-of-memory marker allows setting to a particular channel without even looking at the radio.

In the scan mode, scanning for a busy key or pre-programmed band scan keeps you up to date on the happenings in the area. Very busy frequencies can be skipped by using the up key on the TM-2 microphone. If a full 10 memories are not used, the unused ones can be marked for scan skip so that no time is wasted checking them.

The FM-2033 provides a clean 25 watt output signal across 142-149.995 MHz to operate in balance with most repeaters and provide quieting for simplex operations. MARS (Navy tool) and CAP frequencies are also accommodated even with their unusual repeater splits.

You want convenience, reliability and easy operation for your mobile station and a tough-to-beat dollar value, right? Then check out the FM-2033 at your local dealer TODAY or send QSL for specifications. We think you will want one for yourself.

Specifications are nominal and are subject to change. All KDK transceivers meet or exceed FCC regulations regarding spurious emissions.



AMPLIFIERS • PREAMPS • COUPLERS

THE HELPFUL LINE OF HANDSOME PRODUCTS

The helpful line of handsome products.

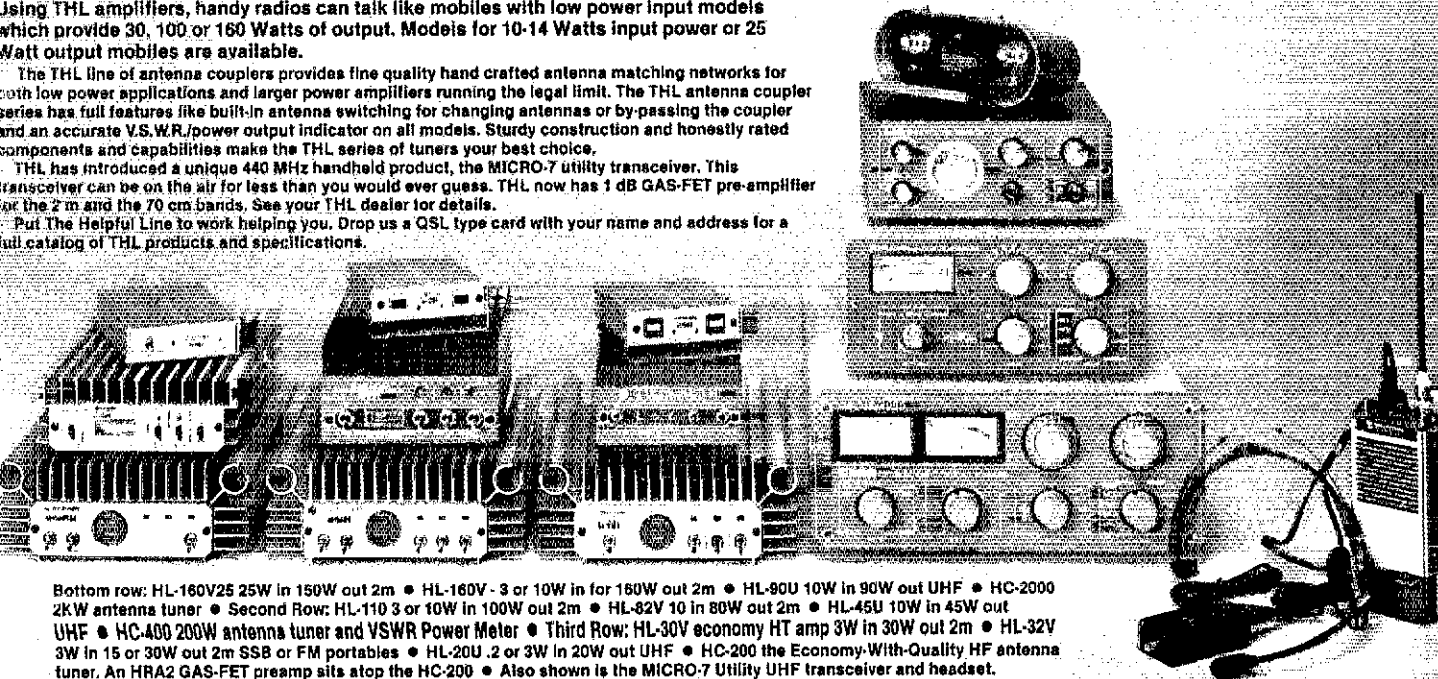
The THL line of amplifiers, pre-amps, antenna couplers and transceivers provides a broad line of solutions to help solve life's problems of needing "just a little more." Whatever it might be, look to THL helpful products to aid in solving the problem. THL can make your signal stronger, your receiving better and can make your HF transmitter happier with the match to the antenna. THL amplifies to a level of 160 Watts on VHF and 90 Watts on UHF.

Using THL amplifiers, handy radios can talk like mobiles with low power input models which provide 30, 100 or 160 Watts of output. Models for 10-14 Watts input power or 25 Watt output mobiles are available.

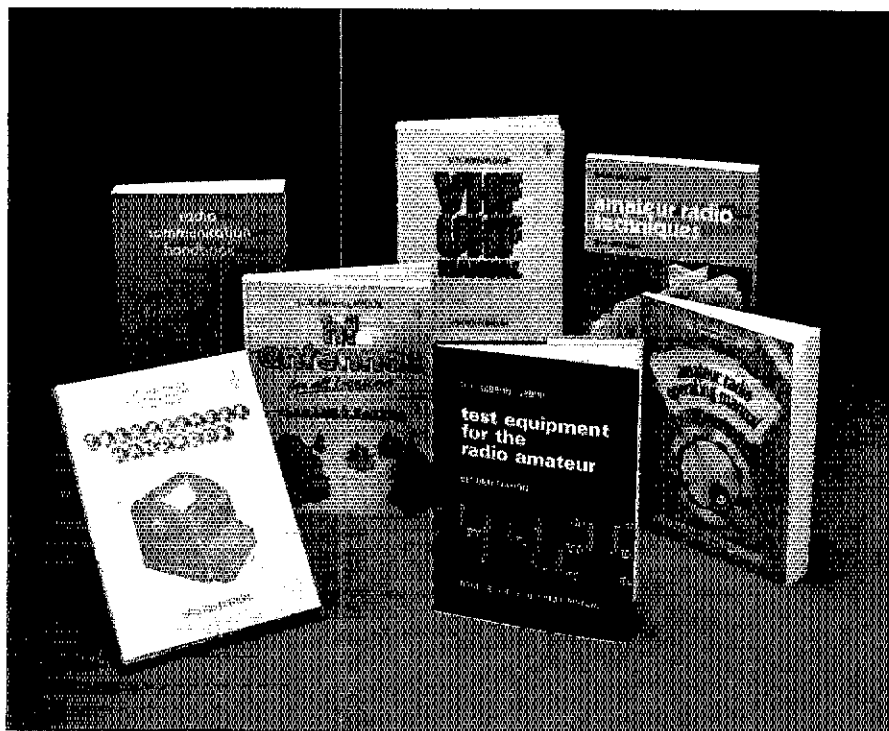
The THL line of antenna couplers provides fine quality hand crafted antenna matching networks for both low power applications and larger power amplifiers running the legal limit. The THL antenna coupler series has full features like built-in antenna switching for changing antennas or by-passing the coupler and an accurate V.S.W.R./power output indicator on all models. Sturdy construction and honestly rated components and capabilities make the THL series of tuners your best choice.

THL has introduced a unique 440 MHz handheld product, the MICRO-7 utility transceiver. This transceiver can be on the air for less than you would ever guess. THL now has 1 dB GAS-FET pre-amplifier for the 2 m and the 70 cm bands. See your THL dealer for details.

Put The Helpful Line to work helping you. Drop us a QSL type card with your name and address for a full catalog of THL products and specifications.



Bottom row: HL-160V25 25W in 150W out 2m • HL-160V-3 or 10W in for 160W out 2m • HL-90U 10W in 90W out UHF • HC-2000 2KW antenna tuner • Second Row: HL-110 3 or 10W in 100W out 2m • HL-82V 10 in 80W out 2m • HL-45U 10W in 45W out UHF • HC-400 200W antenna tuner and VSWR Power Meter • Third Row: HL-30V economy HT amp 3W in 30W out 2m • HL-32V 3W in 15 or 30W out 2m SSB or FM portables • HL-20U .2 or 3W in 20W out UHF • HC-200 the Economy-With-Quality HF antenna tuner. An HRA2 GAS-FET preamp sits atop the HC-200 • Also shown is the MICRO-7 Utility UHF transceiver and headset.



PUBLICATIONS FROM THE RADIO SOCIETY OF GREAT BRITAIN

VHF-UHF MANUAL by G. R. Jessop, G6JP. You will find the new fourth edition of *VHF-UHF Manual* jam-packed with practical theory and construction projects for the region above 30 MHz to 24 GHz, the microwave chapter has been expanded to 83 pages; and includes information on: converters, cavity amplifiers, Gunn diodes, waveguides, directional couplers, and antennas. Receivers and Transmitters for these bands are covered in 181 pages. The balance of this 512-page book contains chapters on propagation, tuned circuits, space communications, filters, test equipment, antennas, and a handy data section. (Since this is a British publication, there is little coverage of the 6-meter band, but many of the 4-meter band projects can be adapted by the experienced amateur for use on 6-meters.) Copyright 1983. Hardbound **\$17.50**.

AMATEUR RADIO OPERATING MANUAL by R. J. Eckersley, G4FTJ. Get the British side of operating. Besides such chapters as Setting up a station, and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU callsign allocations, callsign systems for each country, notes on foreign amateur operation, addresses of licensing administrations and the names and addresses of National Amateur Radio Societies. 189 pages. Copyright 1979, 2nd Edition. Softbound **\$10.00**.

HF ANTENNAS FOR ALL LOCATIONS by L. A. Moxon, G6XN. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; The Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna; Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **\$12.00**

TELEPRINTER HANDBOOK with mechanical teleprinters available at inexpensive prices these days, this book shows how you can setup a RTTY station and keep the equipment running. Besides covering British made **RSGB publications are available from:**

machines, the *Teleprinter Handbook* also covers maintenance, repair and operation of Teletype Model 15, 19, 28, 32, 33, and 43 units. Also covers reperforators, power supplies, demodulators, polar relays, keying methods, filters, and test equipment. 353 pages, Copyright 1983, 2nd Edition, Hardcover **\$21.00**.

RADIO COMMUNICATION HANDBOOK 5th Edition. You probably have the ARRL *Radio Amateur's Handbook* in your library. Now you can have a second source of authoritative radio frequency and electronics information at your fingertips. Contains 23 chapters (778 pages); Principles, Electronic Tubes and Valves, Semiconductors, HF Receivers, VHF and UHF Receivers, HF Transmitters, VHF and UHF Transmitters, Keying and Break-in, Modulation Systems, and RTTY, Propagation, HF Aerials, VHF and UHF Aerials, Mobile and Portable Equipment, Noise, Power Supplies, Interference, Measurements, Operating Techniques and Station Layout, Amateur Satellite Communication, Image Communication, the RSGB and the Radio Amateur, and General Data. Now in one paperback volume. Copyright 1982, **\$22.00**

AMATEUR RADIO TECHNIQUES by Pat Hawker, G3VA. Contains 800 diagrams and 364 pages of circuit ideas and devices which the author has gathered during 22 years of writing the *Technical Topics* columns in *Radio Communication*. It is not a text or handbook, but an idea book — RSGB's version of ARRL's *Hints and Kinks*, but on a larger and more in-depth scale. Copyright 1980, 7th Edition. Soft cover **\$12.50**.

TEST EQUIPMENT FOR THE RADIO AMATEUR by H. L. Gibson, G2BUP. A great addition to the library of the Radio Amateur who builds his own equipment. Beside measuring techniques, you will find a wealth of test equipment you can build yourself. Construction projects range from simple dummy loads and attenuators to a 150 MHz digital frequency counter and timer. You will find simple signal sources for 1296 and 2304 MHz and 10 GHz. Chapter titles and number of pages devoted to each: Current and Measurement — 23, Frequency Measurement — 23, Wavemeters — 19, RF Power Measurement — 9, Aerial and Transmission Line Measurements — 9, Noise Measurements — 8, Components, Valves and Semiconductors — 12, Signal Sources and Attenuators — 12, Oscilloscopes and Modulation Monitors — 8, Power Supplies — 3, and Reference Data — 8. Copyright 1978, 2nd edition. Hardbound **\$11.00**.

THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET
NEWINGTON, CT 06111





Cards and plaque courtesy W6TC

EIMAC's new DX champion! The 3CX800A7.

Varian EIMAC continues to commit its development of reliable tubes for HAM radio.

The new, rugged 3CX800A7 power triode provides 2 kW PEP input for voice service or 1 kW CW rating up to 30 MHz. Two tubes will meet the new, higher power ratings authorized by the FCC.

Designed for today's low profile, compact linear amplifiers, the 3CX800A7 powerhouse is only

2½ inches (6.35 cm) high. Cooling requirements are modest and a matching socket, air chimney and anode clamp are available.

A data sheet and more information is available from Varian EIMAC. Or the nearest Electron Device Group sales office. Call or write today.

Varian EIMAC
301 Industrial Way
San Carlos, California 94270
Telephone: 415-592-1221



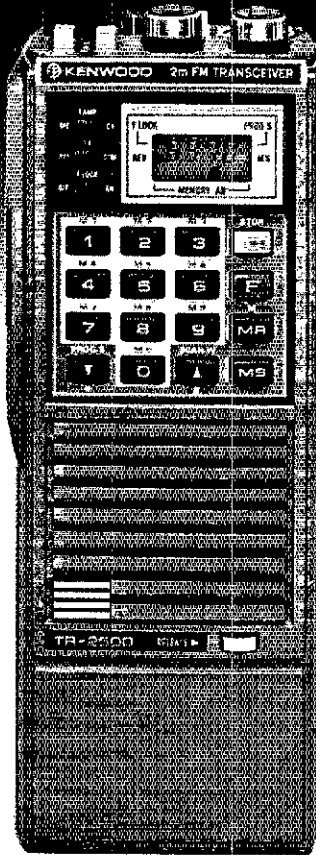
TR-2500

Big performance, small size, smaller price!

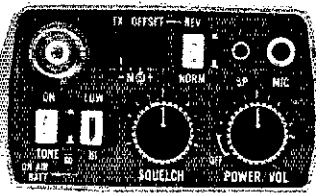
The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs), 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.



CONVENIENT TOP CONTROLS



- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mA H Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger power supply.
- VB-2530 2-M 25 W RF power amps. (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25H Heavy-duty 490 mA H Ni-Cd battery pack.
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.



TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- HI-1.5 W, Low-300 mW.
- TX OFFSET switch, ± 5 kHz to ± 9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- RA-3 2 m 3/8 λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7950/7930

Big LCD, Big 45 W, Big 21 memories, Compact.

Outstanding features providing maximum ease of operation include a large, easy-to-read LCD display, 21 multi-function memories, a choice of 45 watts (TR-7950) or 25 watts (TR-7930), and the use of microprocessor technology throughout.

TR-7950/TR-7930 FEATURES:

- New, large, easy-to-read LCD digital display. Easy to read in direct sunlight or dark (backlighted). Displays TX/RX frequencies, memory channel, repeater offset, sub-tone number, scan, and memory scan lock-out.
- 21 new multi-function memory channels. Stores frequency,

repeater offset, and optional sub-tone channels. Memory pairs for non-standard splits. "A" and "B" set band scan limits. Lighted memory selector knob. Audible "beep" indicates channel 1 position.

- Lithium battery memory back-up. (Est. 5 yr. life.)
- 45 watts or 25 watts output. HI/LOW power switch for reduction to 5 watts.
- Automatic offset. Pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key for manual change in offset.

- Programmable priority alert. May be programmed in any memory.
- Programmable memory scan lock-out. Skips selected memory channels during scan.
- Programmable band scan width.
- Center stop circuit for band scan, with indicator.
- Scan resume selectable. Selectable automatic time resume-scan, or carrier operated resume-scan.
- Scan start/stop from up/down microphone.

- Programmable three sub-tone channels with optional TU-79 unit (encoder).
- Built-in 16-key autopatch encoder with monitor (Audible tones).
- Front panel keyboard control.
- Covers 142.000-148.995 MHz in 5-kHz steps.
- Repeater reverse switch. (Locking)
- "Beeper" amplified through speaker.
- Compact lightweight design.

Optional accessories:

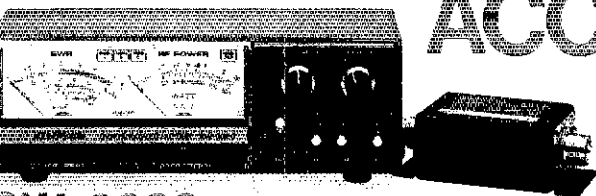
- TU-79 three frequency tone unit
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.



KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

ACCESSORIES

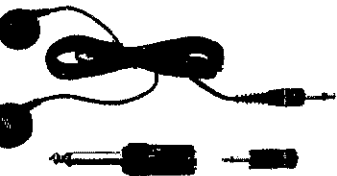
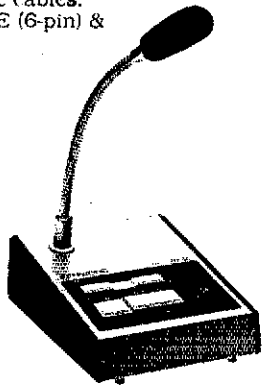
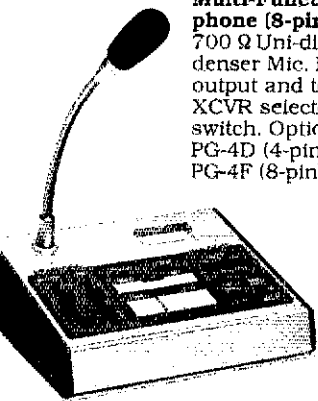


SW-2000

60~6-m 2 KW SWR/PEP-POWER Meter
Up to 3 separate directional couplers may be connected. One SWC-3 is supplied. Optional couplers: SWC-2 (2-m/70-cm, 200 W) & SWC-3 (160~6-m, 2 KW).

MC-85

Multi-Function Desk Top Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. Built-in mic-amp with output and tone control, meter, XCVR selector and UP/DOWN switch. Optional mic cables: PG-4D (4-pin), PG-4E (6-pin) & PG-4F (8-pin).

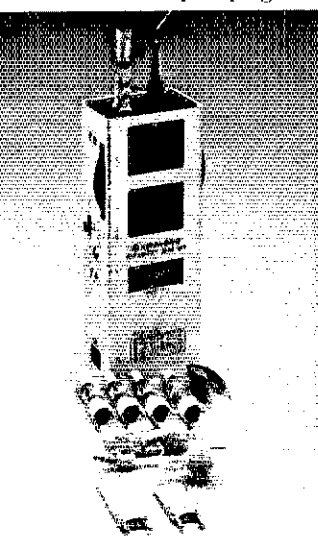


MC-80

Desk Top UP/DOWN Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. with "FLEX" type boom. Built-in mic-amp and UP/DOWN switch. Optional mic plug adaptors: MJ-84 (8p-4p) & MJ-86 (8p-6p).

HS-7

Micro Headphones (16 Ω)
Ultra light weight and portable ear-fitting headphones supplied with two audio adaptor plugs.

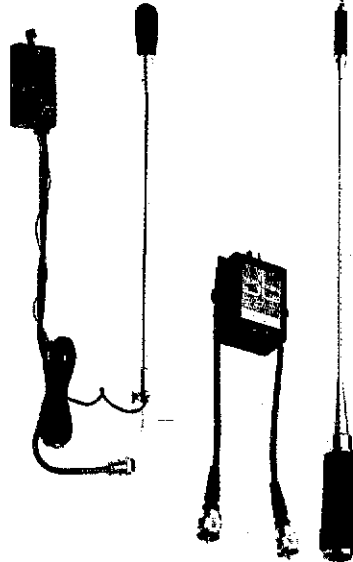


DM-81

100 kHz-250 MHz Dip Meter
All solid-state and built-in battery.

MC-55 (8P/6P)

Mobile Microphone (8-pin or 6-pin)
700 Ω Electret Condenser Mic. with flexible boom, and separate STAND-BY box built-in UP/DOWN switch and 5 minute Time-Out-Timer.



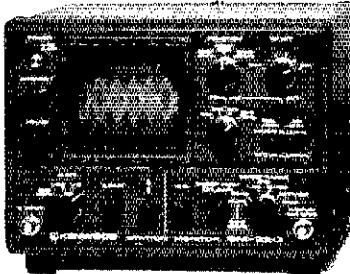
MA-4000

2-m/70-cm Dual Band Mobile Antenna
5/8 λ for 2-m and stacked 5/8 λ for 70-cm. Duplexer is supplied.



PG-1A

Phone Patch (FCC Part 68 registered)



SM-220

Station Monitor/High-Performance Oscilloscope
Pan-display capability with optional BS-8 (for TS-830S/820S/180S) or BS-5 (for TS-520 series). Transmitted waveforms and/or receiving signal waveform monitor. Built-in 2-tone generator.



SW-100A/B

A: 160-m ~ 2-m. B: 2-m ~ 70-cm. 150 W SWR/POWER/VOLT Meter
Compact design with separate coupler, ideal for mobile use. Built-in 0-20 V voltmeter.

MICROPHONES:

- **MC-60A** Deluxe desk top microphone with UP/DOWN switch. (8-pin) Pre-amplifier. 500/900 Ω
- **MC-60N4** Deluxe desk top microphone (pre-amp. not included). (4-pin) 50 k/500 Ω
- **MC-50** Desk top microphone. 50 k/500 Ω (4-pin)
- **MC-48** 16-key autopatch UP/DOWN microphone. (8-pin)
- **MC-46** 16-key autopatch UP/DOWN microphone. (6-pin)
- **MC-42S** Hand microphone with UP/DOWN switch. (8-pin)
- **MC-35S** Noise-cancelling hand microphone. 50 k Ω (4-pin)
- **MC-30S** Noise-cancelling hand microphone. 500 Ω (4-pin)

MICROPHONE CABLES:

- **PG-4A/4B/4C** For MC-60A/60N4. PG-4A (4-pin)/4B (6-pin)/4C (8-pin)
- **PG-4D/4E/4F** For MC-85. PG-4D (4-pin)/4E (6-pin)/4F (8-pin)

MICROPHONE PLUG ADAPTORS:

- **MJ-48** (4-pin mic to 8-pin XCVR)
- **MJ-84** (8-pin to 4-pin)
- **MJ-86** (8-pin to 6-pin)

HEADPHONES:

- **HS-6** Lightweight headphones
- **HS-5** Deluxe headphones
- **HS-4** Standard headphones

GENERAL PURPOSE AC POWER SUPPLIES:

- **KPS-7A** 13.8 VDC, 7.5A intermittent
- **KPS-12** 13.8 VDC, 12A intermittent
- **KPS-21** 13.8 VDC, 21A intermittent

ANTENNAS:

- **RA-3** 2-m 3/8 λ Telescoping antenna with BNC connector
- **RA-5** 2-m 1/4 λ /70-cm 5/8 λ Telescoping dual-band antenna with BNC connector

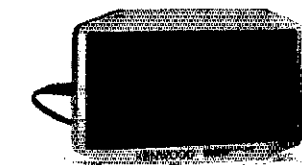
Other accessories:

- **RD-20** Dummy load, 50 Ω , DC-500 MHz, 50 W intermittent
- **SP-40** Compact external mobile speaker
- **AL-2** Lightning & static protector, 50 Ω 1 KW output
- **PG-3A** DC line noise filter for mobile

SERVICE MANUALS:

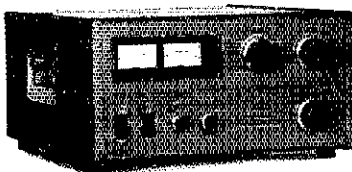
- Available for most transceivers, receivers, and major accessories.

NOTE: Prices and specifications of all Trio-Kenwood products are subject to change without prior notice or obligation.



SP-50

High Quality External Mobile Speaker



TL-922A

160~15-m 2 KW PEP/1 KW DC Input Linear Amplifier
Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

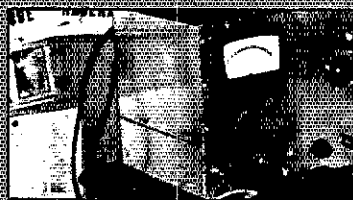
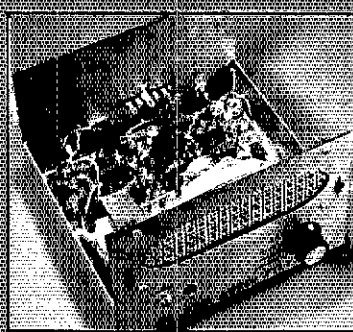
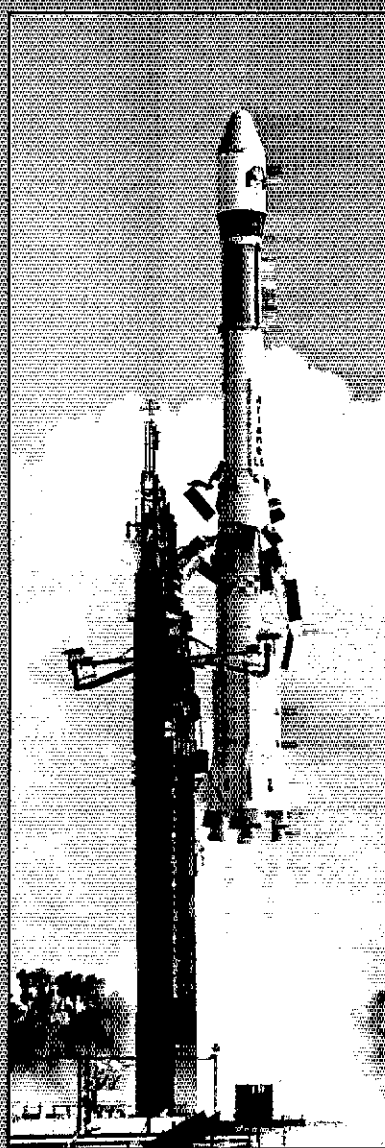
KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

1984

THE RADIO AMATEUR'S

HANDBOOK



Published by the American Radio Relay League

NOVICES: GALAXYIII, 250W, CWSB, \$200. Heath HR1680 receiver. #125. Midland 10M. \$125. Everything excellent. KC9TD, R.R.4, Manito, IL 61546.

COLLINS 75S-1, 32S1, 516F-2 all in immaculate condition plus homebuilt 2kW linear, 4-1000A, vacuum variable, 2000 to 5000 Volt 1 Amp supply with Hypersil xformer, oil capacitors, Silicon diodes, plus mike, Ham M rotator, all misc equip and operating desk, \$1000 the lot OBO, W5DYJ, 2417 Park Lane, Gretna, LA 70053 504-394-4954.

WANTED: Icom AH-1, mobile band-switching antenna system. Must be mint condition. K4HCA, 201-584-2547.

70 cm AMPLIFIER. Commercial quality, made by Farinon Electric, uses two 7034's, trade for six or two meter amplifier. 503-267-6064 Ray, W7TZO.

\$800-KENWOOD TS180S w/SM220 Station Monitor, PS30 power supply, SP180 speaker, MC50 mike, MFJ-572 SSB/CW active filter, Heathkit HD-15 phone patch. \$600-Heathkit SB211 linear w/HM2140 Watt/SWR meter, Dentron 3kW antenna tuner, MiniQuad antenna w/rotator. You pay shipping. Louis, N6EFO, 714-622-3248.

ALL SOVIET QSL Buro addresses, \$5. KA2MXO.

WANT MFJ Versa Tuner with SWR meter. Also need MFJ-1020 Indoor Antenna. KB6BMS, P.O. Box 1240, Mendocino, CA 95460.

JOHNSON THUNDERBOLT linear. 2000W PEP. 1.8-30 continuous. Not working. Good final. New front panel. In Chicago. Best reasonable offer. Also HT32B, and unused AR-22 rotator. John Davis, 138 West Gorham, Madison, WI 53703.

ICOM 740 mint with FM installed, memory backup, mike, all cables, manual, \$760 with 20R power supply or \$700 alone. B. Carling, AF4K, 5131 Raywood Lane, Nashville, TN 37211, 615-834-3204.

TEN-TEC Omni-D, Series B with CW filter, noise blanker, mike, and power supply \$495. W7AWA, Stan, 10525 180th SE Snohomish, WA 98290, 206-668-5892.

GERMAN FOR Amateur Radio. 90 min. cassette and text. \$7.95 ppd. Danrick/Soundevents, 213 Dayton Ave., Clifton, NJ 07011.

WANTED: Old bugs for my telegraph and radiotelegraph key collection. I am trying to find each make and model of bug manufactured before 1950. Vibroplex, Martin, McElroy, Bunnell, Mecograph, MacDonald, etc. Also looking for Spark keys, sideswipers, cooties and keys of historical significance. 73 de K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

LOGBOOK-V2: A complete log maintenance program consisting of seven modules to handle all phases of logging. Features multi-key and multi-level searching of thousands of records in seconds and full feature editing. Prints Station Logs, Contest Logs, Contest Dupe Sheets, QSL Cards, WAS Lists, DXCC Lists, 6-Band Lists. For TRS-80 Model I, Model III & Model IV. Price \$39. Reviewed December QST. Supplied on 5 1/4" DOSPLUS formatted disk with complete documentation. Specify model/density of computer when ordering. WB8YUO, 6333 Willowdale Court, Columbus, OH 43229, 614-895-1130.

SELL: Swan 6-meter model 250C, mint condition. (2) 6146 finals. Less power supply (available). Best offer. Write: R. Monteroso, 4156 Harriet Road, Bethpage, NY 11714.

DRAKE TWINS: R4B, T4XB, AC4/MS4, manuals, cables, cartons, mint condition. \$150. Eleven Drake crystals \$5 each. Knight T-60 transmitter \$50. Heath HW-7 QRP transceiver \$50. Hallicrafters 6X-25 receiver, speaker, original manual, \$100. 1 ship continental USA. Novice XYL needs no-tune rig. Steve Weber, KD9BO, 219-464-2877.

TS-930S w/tuner, pair 500 Hz filters. SP930 11350. Henry 2K Classic "X" w/4KV xtrm #1400. TR-7950 PS12 \$350. Diawa 720B \$100. MM-2, chrome Bencher \$140. Dentron AT-3K tuner \$150. Original cartons, few hours use. 314-642-8780, N6NT.

WANTED: Mini-Quad HQ-1 ant.; AEA, mod. CK-2 or Viking SKM-001 memory keyer; Sale or Trade: Hammarlund SP-600, mint in cabinet. P. A. Beautrow, 111 Sequoia Glen, Novato, CA 94947.

WANTED: GOOD quality 2m FM and QRP equipment. WB4PNE, 1009 Oakmont #7, Memphis, TN 38107.

HAPPY JULY 4th from the crew at Junior High School 22 on Manhattan's Lower East Side. Help start our new term off with a Bang, send us your old unwanted equipment today. WB2JKJ via Callbook for information.

SELL - KENWOOD Twins R599D-T599D perfect condition with original boxes & cables \$425 for both. Ill ship. K4VJO, 2110 Cheltenham Blvd, Greensboro, NC 27407 eve. 919-294-0776/day 919-288-5131.

SALE HEATH SB102 w/pwr supply. Cond excellent, \$350 incl UPS 517-750-3805 after 2300 UTC. WB8JIR.

BEGINNER'S STATION - Swan 350B with mike, set spare tubes, factory realigned, mint, \$275; Cushcraft ATV4 vertical antenna with radials, \$50; 37 ft aluminum tubing mast, \$20; Uship; WBQDF, 415-453-8765.

ENGINEERING SOFTWARE - CPM, MSDOS, TRSDOS, free flyer, PLOTPRO - graph printing program. Linear/log/semi-log, multiple plots, grid lines, labeling, \$52.95. ACNAP - Analyzes active/passive electronic circuits. MonteCarlo, Worst Case, sensitivities, \$52.95. SPP - Signal Processing, FFT, linear/nonlinear, LaPlace, transient analysis, \$62.95. BV Engineering, Box 3429, Riverside, CA 92519 714-781-0252.

89' EXTRA heavy motorized Tristao crank-up tower \$3000. Telrex BA3/2899RIHS rotor, 18,000 in lbs. torque, \$1000. Both less than year old. 314-642-8780 N6NT.

Have an interesting item you think would make a good Stray? Submit it to ARRL Hq. by the 10th of the second month preceding desired publication. If photos are included, use good quality, black-and-white ones. Above all, the material should be of interest to most QST readers!



Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
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P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
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F432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95
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9P28VD	28-30	<1.2	15	0	DGFET	\$59.95
9P50VD	50-54	<1.4	15	0	DGFET	\$59.95
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SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	<1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	\$109.95

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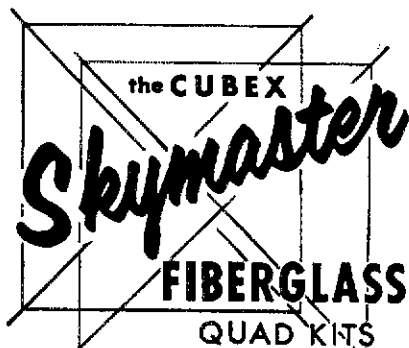
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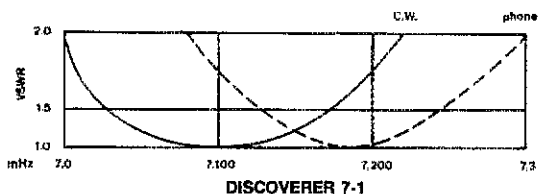
Rediscover 40 meters with the **DISCOVERER SERIES** Rotatable Dipole or Monoband Beams

This 40 meter antenna series gives you three choices. The Discoverer 7-1 which is a rotatable dipole. Or the Discoverer 7-2, a two-element beam you can upgrade to three elements with a kit.

Whichever you choose, you'll get Hy-Gain's superior mechanical design. Such as tapered tubing to reduce weight and wind surface area. Maintenance-free stainless steel hardware and preformed clamps for an easy, rugged assembly.

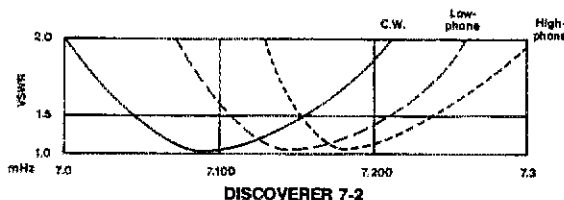
You also get superior performance. Wide bandwidth with SWR of 1.5:1 or less at resonance. High-Q efficiency because there are no high-loss coils. A low voltage feed point that eliminates insulator failure and assures that the antenna can handle twice the new legal power limit.

The Discoverer 7-1 dipole can be added to most existing rotatable beam installations. This model can be tuned to either 30 or 40 meters.

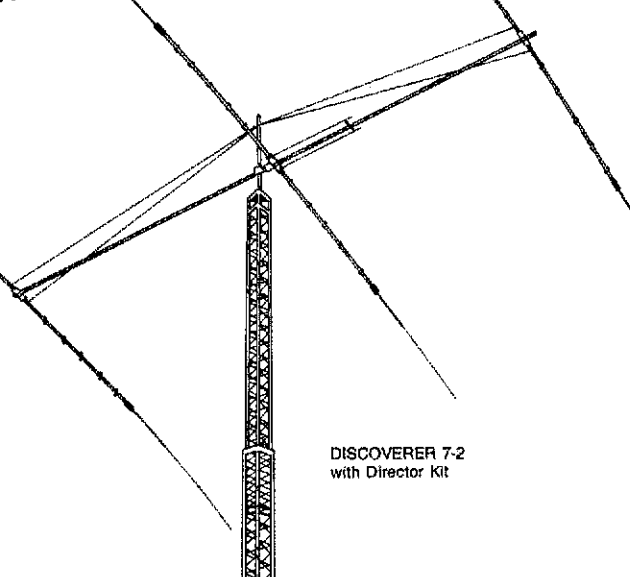


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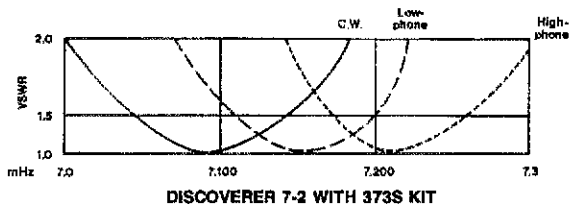


DISCOVERER 7-2



DISCOVERER 7-2
with Director Kit

By adding the Director Kit to the Discoverer 7-2 you create a three-element beam on a boom of only 35 ft. (10.7 m), that outperforms many of the heavy-weight giants with much longer booms. In fact, the kit doubles the effective radiated power of the Discoverer 7-2, and nearly doubles the front-to-back ratio. And, because the antenna is still more compact than a "giant", you only need a medium-duty tower such as the HG52SS. All of which saves you money and space without compromising safety or performance.



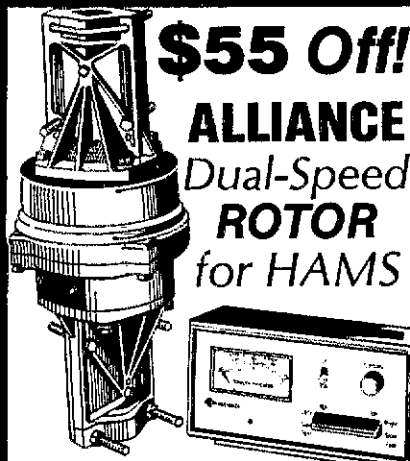
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WANTED: Someone to repair the power supply problem in my SR-82 calculator. K6KH.

WANTED: 220 MHz Yaesu, Clegg or Midland crystal radios for remote base linking project. N5DUB, 1706 E. Oklahoma. Enid, OK 73701. 405-233-4890.

YAESU FT-301, FP-301, CW filter, mike, 30 meter band installed by Yaesu, manual and original boxes. Mint, \$415. WB7VOO, 602-298-4820.

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SWAN 500 w/AC & DC supplies, spare tubes \$325; Mosley TA-35 beam w/coax \$310; Ham IV Rotorator complete w/cable \$200; 47 ft. Rohn tower, 5 sections \$235; 11-element 2-meter beam w/coax \$35; PS-12A pwr supply (used w/Clegg FM-28) \$80; old style Vibroplex s/n 159799 \$5; 5/8 wave mag mount, 2-meters \$25; D-104 mike, stand, PTT switch \$35; M. C. Jones MicroMatch .5 to 225 MHz w/coupler, Model 281.1 w/manual (2 ea.) \$20 ea.; 80-meter & 40-meter inverted vee dipoles w/baluns and coax \$35 both. Estate of late K1HXQ. Call days W1WEB 203-436-3345. Best offer accepted.

SIX METERS: Drake TR6, VFO, AC4 pwr sup, spkr, mike \$500. Swan amplifier Mark 6B 2kW \$800. Excellent condition, all manuals. Receiver, Drake R7, all filters, fan, noise blanker \$850. Pat Morton, 7230 Gormel Drive, Springfield, VA 22150 703-569-8363.

DIGITAL DISPLAYS for FT-101's, TS-820's, Collins, Drake, Swan, Heath and others. Write for information. Grand Systems, P.O. Box 3377, Blaine, WA 98230. 604-530-4551.

SWAN AMP: Model 1200X, 1200 Watts PEP SSB 80 to 10 meters \$250. Dentron Super Tuner Model 160-10AT 1.7 to 30MC \$100. Kenwood 700A 2-meter, all-mode transceiver \$425. Norman Cardini, K2USV, 54 Moffett Street, Fords, NJ 08863, 201-738-4696.

TRADE FOR 2m FM or sell best offer: Heathkit SSB station complete - works - 6B-300 w/all crystal filters, SB-600 speaker, SB-401 transmitter, microphone included, Mack Baxter, RD #3, Naples, NY 14512. Ph. 716-374-6579.

PLATE TRANSFORMER for sale from retired broadcast transmitter: 230/208 Volt primary, 3200 Volt secondary at 2.23 KVA CCS, 125 pounds, \$200 plus shipping. Filter choke: 4 H at 1.5 Amp dc, 4 kV rating, 93 pounds, \$125. Joe, K9RZE, Box 1114, Frearport, TX 77541. 409-233-3390.

SELL HAMMARLUND HQ129X/speaker and Viking Ranger #145, W2KNP, 217A Medford Court, Manalapan, NJ 07726.

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8874'S, NEW Eimac #180, W9ZR, 1-414-434-2938.

SELL: ALPHA 76PA amplifier 3-8874 tubes, excellent condition, best reasonable offer, W8MVE, 650 Daphne St., Broomfield, CO 80020, 303-486-6796.

TELEX "Big Bertha" pole, 9 antennas and rotor box. \$6,500 write for specs and picture. Reynolds, Wellington Road, Winston-Salem, NC 27106.

KENWOOD 7400A, 100 Hz PL, \$175. WB8SFF, 313-881-4888.

ICOM IC-2AT, 16 key TTP, IC-BP5, PL. \$240/offer, DE WB9YBM.

ORIGINAL OWNER Icom IC-230 2 meter rcvr, manual, etc., \$120. Bernie Chap, 402-731-0128, 2811 Bonnie St., Omaha, NE 68147.

YAESU World Clock QTR-24, never used, \$30. Wawasee SWR/PWR meter #JB2000SW, \$35. Microlog AVR-2 Decoder-Video Generator, \$275. Sanyo VM4215 15" diagonal video monitor, \$175. I ship. KA2BUF, 518-374-8399.

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DRAKE Complete Station - TR4CW, AC4, MS4, MN2000, 3300 filter, L4B amplifier with 10 meter, Sure mike, Waneco filter R1040R, Bencher Keyer, and dummy load. All in mint condition, all manuals, in original cartons, \$1588. Will not split. W. H. Capler, N8AWZ, 313-326-8111.

SELL COLLINS 75A-4, manual, I filter \$75. Icom 20 amp power supply-PS 20, W2EZN, 431 Oakland, Maple, NJ 08052, 609-683-8137.

ICOM STATION: IC701, IC701PS, mike; IC211, mike; 4BTV vertical antenna. \$850/OBO. Want TenTec 509. Bob, KF6II, 2212B Newkirk Avenue, Carson, CA 90745, 213-518-1845.

HEATH IO-4550 Oscilloscope \$300; HD-1250 Dip Meter

\$50. KD7AP, 2212 S. Johnson, Mesa, AZ 85202, 602-820-3310.

ICOM IC-740 for sale. Excellent contest radio, a little bit too big for mobile. Includes internal power supply and mike. \$799.50. Will ship via UPS continental U.S. Wayne, KH6WZ/W1, c/o ARRL, 203-666-1541.

SELL YAESU FT102 with SP102 spkr. & MD-1 mic. - \$550. Ameritron AL80 - \$400. Icom 730 - \$485. All mint. WBOWD 415-728-7136 eve.

WANTED: Icom IC-2 KLM. Must be mint with original instructions, etc. K4HCA/2, 201-584-2547.

NEEDED: Information on parts, schematic and service manual source for Spectronics Digital Display DD-1C. W5EPW, Box 5191, Mississippi State, MS 39762.

SELL: IRL FSK-500 demodulator. New, \$169. Manual. Will ship. A. Meinhardt, W2CMD, 8406 NW 59th St., Tamarac, FL 33321.

BC-221-B, Transistorized, manual, \$25. 15M beam HyGain, \$25. B&W Grid Dipper, \$35. VHF Dipper, \$10. Various meters, \$2 each. Heathkit SWR bridge, \$5. Hustler mobile antennas, 10 thru 40M, spring, mount, disconnect, \$40 all. Model 15 Teletype, manual, \$30. Mac-Key Bug, \$15. W8KV, 614-775-6028.

TEN-TEC STATION: 509 Argonaut, 405 linear, 251 AC supply, 205A callibrator, 208 CW filter, transmatch in matching cabinet, sold as set only! \$475 pick-up, \$525 shipped. Paul Bock, K4MSG, 204 S. Harrison Rd., Sterling, VA 22170, 703-435-2994.

SWAN 350 digital, microphone, tubes, 14AVQ, \$375. Zack Botwinick, 4721 Northwest 19th Court, Lauderdale, FL 33313.

BIRD WANTED: Model 43 wattmeter, plug in elements, carry case. Contact George Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

CLIPPERTON-L with 10 meters and ext. Dentron tuned input, new lineals \$425. WB8RJX, 8239 S. Morrish, Swartz Creek, MI 48473. 313-635-4770 after 4 PM.

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TWO-METER Repeater for sale. \$450 or best offer, SASE for particulars. WB9GPI, 415 Kistler Drive, La Crescent, MN 55947.

FOR SALE: Kenwood TS-620 \$575. Icom 225 with nicads and charger. \$100. Both units used only once to test, still brand new. Call 517-335-7756, evenings up till 10 PM, Warren Mason.

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REPLACE rusted antenna bolts with Stainless Steel, Small quantities, free catalog. Elwick, Dept. 518, 230 Woods Lane, Somerdale, NJ 08083.

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SALE: Kenwood transceiver TS-830, \$615. Vertical antenna Butternut 5BTV 10-80 meter, \$65. Kenwood Dipmeter DM81, \$75. All equipment in mint condition and never altered, with manuals. Will ship in original packaging. KJ7Y, 509-884-6152.

WANT hi-voltage transformer for Tektronic RM503 oscilloscope or info on winding same. WBBOC.

QST 1940 to 1978 \$25 plus UPS Dade, W8QMM, 1322 14th St., Bettendorf, IA 319-355-2191.

FOR SALE - Hy-Gain Jr. - good cond. Pick up only - W8QIG, Belleville, KS 913-987-6527.

WANTED: Antique Radio: Radiola 20 to replace the one loaned as a kid to a friend(?). Replies answered promptly. Gene Reynolds, W3EAN, 53 Maple Rd., Haverford, PA 19041.

SELL TR-2400, case, spare battery pack. Recently serviced by Kenwood in excellent condition. Best reasonable offer. Also Sony ICF-2001 portable all-band receiver in excellent condition. Best reasonable offer. Alan, WB2DZW, 27 East 65th, Apt. 5D, New York, NY 10021. 212-879-7991.

AMATEUR SATELLITE converters. Enough Hamtronics gear to put your HF station on mode A, B, or J. Will sell all or part. Call or write for equipment list and estimated values. N5BF, 1850 El Paseo #2307, Houston, TX 77054, 713-789-1137.

SALE: Vibroplex Deluxe Keyer, \$50. Panasonic Slimline, 12 hrs. Tape recorder with automatic voice actuator for logging, \$75. Digital Multimeter Radio Shack Micronta, \$50. Coax switch B&W Mod 594, \$15. QST, April 1980-December 1984 and 73 Magazine August 1982-May 1986, highest bid. KJ7Y, 509-884-6152.

DRAKE TR7 #8743 WARC/IF PS-7 mike, fans \$850. W2LUN, 4385 West Lake, Canandaigua, NY 14424, 716-394-1815.

SELL - 8 fiberglass quad arms 12 ft. long with spiders \$100. N2AD 315-446-6388.

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"Heavy Duty is Relative!"

In our lineup of rotators, the CD45 II is rated as medium duty. Some of our worthy competitors offer similar rotators which they rate as "heavy duty" and, within their product line, they are. But if you compare all rotators, it's a different picture. Here is a comparison of our CD45 II, our HAM IV and the Alliance HD73 (Specifications as stated by the manufacturer).

	HD73	CD45 II	HAM IV
Output Torque	400 in. lbs.	600 in. lbs.	800 in. lbs.
Gears	Plastic and Steel	All Steel	All Steel
Control Box Weight	3.8 lbs.	6.8 lbs.	6.8 lbs.
Rotor Unit Weight	6.5 lbs.	8.5 lbs.	10.5 lbs.
Direction Indicator Potentiometer	Carbon	Precision wire wound	Precision wire wound
Rotation Limiter	Mechanical stop only	Limit switches with mechanical stop	Limit switches with mechanical stop
Braking Power	1600 in. lbs. "Windmilling"	900 in. lbs. "Holding"	5000 in. lbs. "Holding"
Antenna Size Rating	10.7 sq. ft.	6.5 sq. ft.	15 sq. ft.

Wind load rating is an important specification too. Unfortunately, there is no standard method of measurement. For example, a long boom antenna with an unbalanced wind load is a much tougher problem than the calculated square area of the antenna would suggest. So we take a conservative "worst case" approach and rate the CD45 II at 8.5 square feet. Yet, the HD73, a lighter unit, is rated at 10.7 square feet. You be the judge.

Here is a complete listing of Hy-Gain rotators and the typical antenna systems that each will comfortably and reliably manage.

AR40—Primarily used for small to medium size VHF and UHF beams. Can also be used with a 10 or 15 meter, 3 element Yagi.

CD45 II—Recommended for a 3 element tribander such as our Explorer 14. Will also manage a medium sized VHF stack and is a good choice for the Azimuth rotator on a good sized satellite system.

HAM IV—A favorite for long boom tribanders such as our TH7DX. Would also be a good choice for an Explorer 14 stacked with a VHF DX antenna or a satellite system.

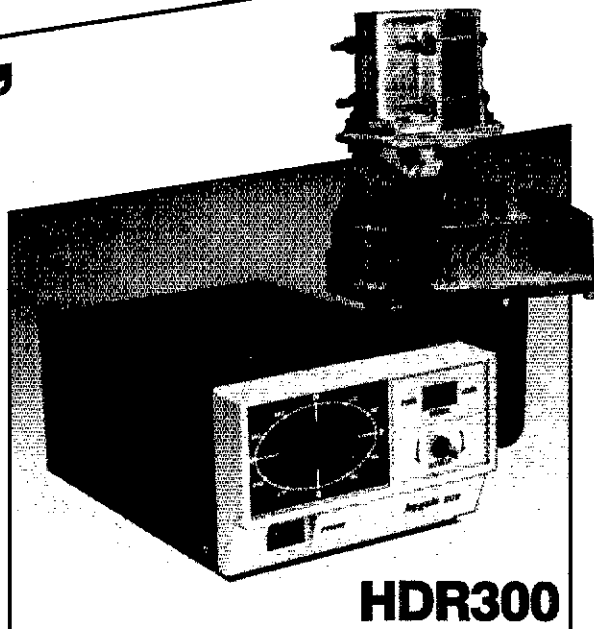
HAM SP—A modified Ham IV with a special control unit for a blind operator. Single knob directional control system includes a compass rose with braille markings. An audible beep indicates rotator start and stop.



T2X—The well-known Tail Twister manages combinations such as a TH7DX stacked with a small 2 element 40 meter beam. Also a great choice for a substantial VHF "weak signal" array. Of course, the ever popular stack of 3 or 4 element 10, 15, and 20 meter monobanders is a safe match for the T2X.

HDR300—This 5000 inch pound torquer is our idea of heavy duty. This is the choice for stacked HF "Long Johns" or the full sized 3 element 40 meter monsters. A favorite too for the giant VHF "weak signal" systems where the 1" rotator control and indicator accuracy is a must.

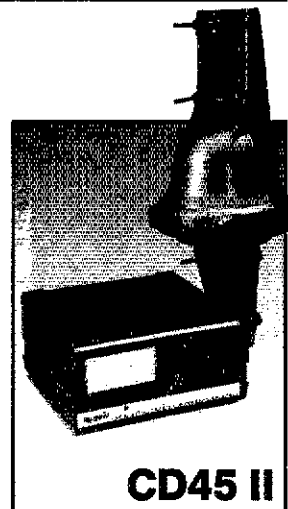
CHOOSING THE RIGHT MODEL—The mistake most commonly made is selecting a rotator for the antenna being installed at the time and not looking forward to the antenna system that you ultimately plan. A rotator that is not over-loaded will deliver many years of reliable service. So, when you choose yours, plan ahead and buy the model that will handle the ultimate load. If in doubt, drop us a note. We will share our experience with you. Long term, you will save money.



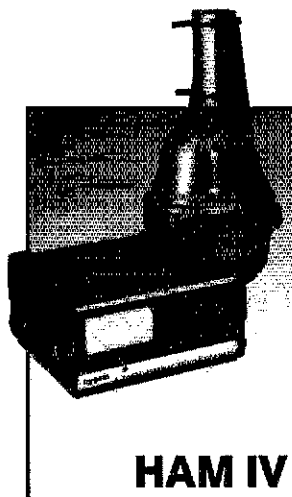
HDR300



AR40



CD45 II



HAM IV



T2X

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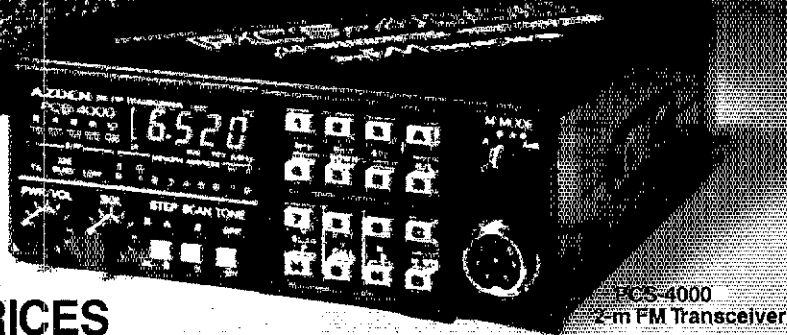
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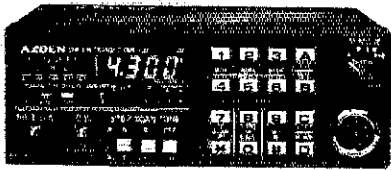


PCS-4000
2-m FM Transceiver

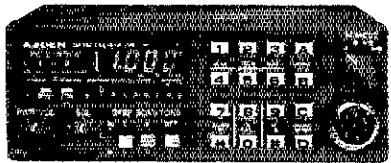
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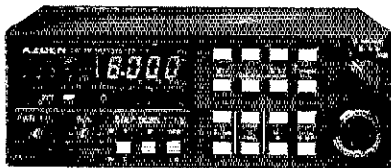
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- **WIDE FREQUENCY COVERAGE:** PCS-4000 covers 142,000-149,995 MHz in selectable steps of 5 or 10 kHz. PCS-4200 covers 220,000-224,995 MHz in selectable steps of 5 or 20 kHz. PCS-4300 covers 440,000-449,995 MHz in selectable steps of 5 or 25 kHz. PCS-4500 covers 50,000-53,995 MHz in selectable steps of 5 or 10 kHz. PCS-4800 covers 28,000-29,990 MHz in selectable steps of 10 or 20 kHz.

- **CAP/MARS BUILT IN:** PCS-4000 includes coverage of CAP and MARS frequencies.

- **TINY SIZE:** Only 2"H x 5.5"W x 6.8"D. COMPARE!

- **MICROCOMPUTER CONTROL:** At the forefront of technology!

- **UP TO 8 NONSTANDARD SPLITS:** Ultimate versatility. COMPARE!

- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard simplex or plus/minus offsets. Standard offsets are 600 kHz for PCS-4000, 1.6 MHz for PCS-4200, 5 MHz for PCS-4300, 1 MHz for PCS-4500, and 100 kHz for PCS-4800.

- **DUAL MEMORY SCAN:** Scan memory banks either separately or together. COMPARE!

- **TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan the two segments either separately or together. COMPARE!

- **FREE AND VACANT SCAN MODES:** Free scanning stops 5 seconds on a busy channel; auto-resume can be overridden if desired. Vacant scanning stops on unoccupied frequencies.

- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency.

- **TWO PRIORITY MEMORIES:** Either may be instantly recalled at any time. COMPARE!

- **NICAD MEMORY BACKUP:** Never lose the programmed channels!

- **FREQUENCY REVERSE:** The touch of a single button inverts the transmit and receive frequencies,

no matter what the offset.

- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.

- **BRIGHT GREEN LED FREQUENCY DISPLAY:** Easily visible, even in direct sunlight.

- **DIGITAL S/R/METER:** Shows incoming signal strength and relative power output.

- **BUSY-CHANNEL AND TRANSMIT INDICATORS:** Bright LEDs show when a channel is busy and when you are transmitting.

- **FULL 16-KEY TOUCHTONE™ PAD:** Keyboard functions as autopatch when transmitting (except in PCS-4800).

- **PL TONE:** Optional PL tone unit allows access to private-line repeaters. Deviation and tone frequency are fully adjustable.

- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and audio fidelity.

- **HIGH/LOW POWER OUTPUT:** 25 or 5 watts selectable in PCS-4000; 10 or 1 watt selectable in PCS-4200, PCS-4300, PCS-4500, and PCS-4800. Transmitter power is fully adjustable.

- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV or better for 20-dB quieting. Circuits are designed and manufactured to rigorous specifications for exceptional performance, second to none. COMPARE!

- **REMOTE-CONTROL MICROPHONE:** Memory A-1 call, up/down manual scan, and memory address functions may be performed without touching the front panel! COMPARE!

- **OTHER FEATURES:** Dynamic microphone, rugged built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses, and hardware are included.

- **ACCESSORIES:** CS-7R 7-amp ac power supply, CS-4.5R 4.5-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.

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18AVT/WBS (80-10 meters) The most successful vertical antenna of all and for good reasons. Broadband performance covers the 40, 20, 15 and 10 meter bands in their entirety. Automatic 5 band switching is accomplished by mechanically superior, highly efficient factory tuned Hy-Q traps with large coils for consistent performance at 2:1 or lower VSWR on 40-10 meter band edges; bandwidth on 80 meters is approximately 40 kHz with VSWR below 2:1. A factory tuned matching network for 50 ohms impedance is dc grounded for lightning protection and reduced precipitation static. The mechanical integrity of this antenna is so stable that performance does not change with the weather. The 18AVT withstands winds to 80 mph (128 km/h) without guying. All stainless steel hardware is included.

14AVQ/WBS (40-10 meters) Offers very similar construction and the same excellent broadband performance as 18AVT over the entire 40, 20, 15 and 10 meter bands; automatic band switching with mechanically superior large-coil Hy-Q traps and very low angle radiation pattern. The smaller, low visibility size also makes the 14AVQ very suitable for roof mounting. The optional 14RMO roof mounting kit includes base plate, mast and radial/guy wires. All antenna hardware is stainless steel.

18 HTS (80-10 meters, 160 meters with optional loading coil) The superb reliability of the 18 HTS is manifest in installations now over 20 years old. And, with the improvements we made over the years, the 18HTS is now better than ever. Automatic band selection is achieved through a unique stub decoupling system which effectively isolates various sections of the antenna so that an electrical $\frac{1}{4}$ wavelength (or odd multiple $\frac{1}{4}$ wavelength) exists on all bands. For example, outstanding broadband performance on 20, 15 and 10 meters is achieved with an extended $\frac{1}{4}$ wave collinear. On 80 meters bandwidth is approximately 250 kHz at 2:1 VSWR. With the optional base loading coil exceptional performance is also provided at 160 meters. The galvanized tower requires no guying and withstands winds to 100 mph (160 km/h). A special hinged base allows complete assembly at ground level and permits easy raising and lowering. Includes stainless steel hardware. WARC kits to be available.

Other Hy-Gain vertical multiband antennas are available though not shown here. The 12AVQS (20, 15, 10 meter) is similar to 18AVT above but with VSWR of 1.5:1 or less on all bands. The 18VS (80-10 meter) comes with a base loading coil and may be installed on a short mast driven into the ground. All include stainless steel hardware.

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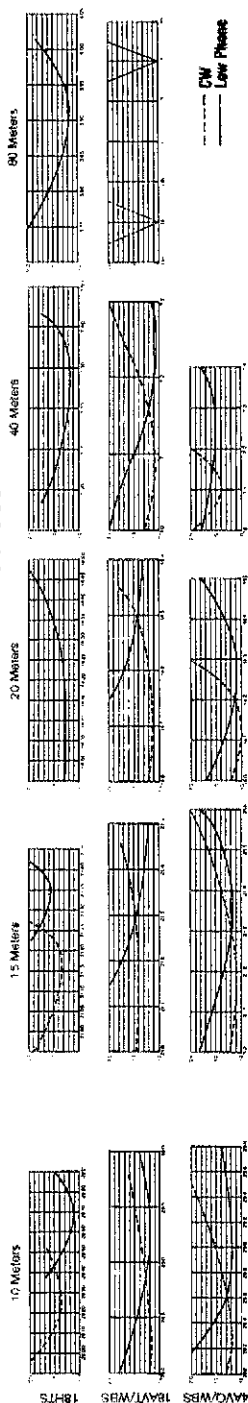
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14AVQ/WBS 18 (5.5 m)

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- * Send greetings from LARE's message center (for QSL or SWL, send SASE to 221 Highway Drive, Jefferson, LA 70121)



BTE LK1000HD linear amp \$750. HRO 500 rec. \$1200. Consider trade for late S-Line or KWM-2. WA0UKJ, 314-428-1963.

WANTED: National receiver NC-240-D in working order or not. W2VDB, 1146 Sunrise Blvd., Rotterdam, NY 12306.

WANTED: TI99/4A disk memory drive, Model PHP-1250. WA2VJL, POB 1382, San Benito, TX 75586.

FOR SALE: HP-5253A, 500 MHz converter, \$125/obso; TEK 1A1 \$100/obso; HP-5253B, 500 MHz converter, \$150/obso; Data-Pulse 106A Pulse Generator, \$100/obso; Zener diodes, 43 volts, 50 watts, \$1 each, 6/85; Mercury wetted relays, 2 PDT-24V, \$5; recent "Official Airline Guides," \$5; technical data books, SASE for list. Frazier, Box 972, Windermere, FL 32786.

DRAKE TR-4C, AC-4/MS-4 power supply/spkr, D-104 mic, MFJ keyer, paddle, Heath SWR/pwr meter, spare final tubes and manual. Excellent condition. \$350. K4YZT, Bob Smith, 5104 Bellemeade Ln., Alexandria, VA 22311 703-671-9044 (home) or 202-863-7359 (office).

ROHN HDBX-48 tower (never used-unassembled): 48' self-supporting tower \$250. Jim, WB2REM, 23 Pennroad Ave., Trenton, NJ 08638, 609-771-8070.

TI-99/4A BASIC cassettes, quality tapes: Send/Receive Code Practice, \$9.95; Minifut Propagation, \$9.95; Ham Computations and Design (Yagis, Pl and L Networks, Beam Heading, Line SWR and Input Impedance, Inductors, Dipoles, Ground Reflection Factors) \$10.95; A C Buxton, W8NX, Ham Software Co., 2225 Woodpark, Akron, OH 44313.

HW101, CW filter, ps, mic, HM102, \$300. WA2HAW, 203-379-9005.

DRAKE WANTED: T-4 or T-4B transmitter (model without VFO), AC-4 supply. Contact George Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

1985 CALLBOOKS: Prepublication orders this month: either, \$16; both, \$29. "Low/Medium Frequency Scrapbook," Ken Cornell, 4th edition, first printing, \$7; 2/5/12; dealers, 10/40. Postpaid U.S. Century Print, 6059 Essex Street, Riverside, CA 92504, 714-887-5910.

WANTED - KENWOOD TS-820 or TS830. Mint condition only. W7IQZ, 208-377-4918.

IBM-PC RTTY. CompRtty is a comprehensive RTTY communications program for the IBM-PC. Features include: all standard ASCII and BAUDOT speeds, selectable parity, split screen display with status, hardcopy, diskcopy, key-stroke detect for autostart/text file transfer, autologging, 12 programmable messages. Ideal for traffic handling. Requires 64k PC-DOS 1.1 or 96k PC-DOS 2.0, disk, IBM compatible serial port and an RS-232C compatible TU. \$50. David A. Rice, KC2HO, 7373 Jessica Drive, North Syracuse, NY 13212.

CRYSTALS & TUBES: Build something! QRP rigs etc. Amateur - Experimenters. 20c stamp for circuits and listings. Made to order FT-243's also surplus listings - 1700 to 60,000 kilocycles, crystals and sockets. W0LPS. "Crystals Since 1933". Antique tubes - Old timers - collectors. 203-A triodes \$9.95, 860 Pentodes \$12.50, unused new condition. Postage \$2.50. C-W Crystals, Marshfield, MO 65706.

SALE: Kenwood TS-820S with outboard VFO in very good condition, \$500. W6CP - 602-986-2065.

ROSS \$\$\$\$ NEW July Specials: If this month's special is not what you are looking for send Call Letters name & phone # for personal price quote. Over 6,000 ham related items in stock. Icom # IC-02AT \$298.90, IC-471A \$709.90, IC-701 \$799.90, IC-490A \$554.90, IC-45A \$309.90, IC-25A \$279.90, IC-R70 \$569.90, IC-R71A \$649.90, Kenwood # TS-430S \$769.90, TR-8400 \$379.90, TR-9000 \$379.90, TS-530S \$569.90, TR-9130 \$449.90, TS-780 \$839.90, TR-7950 \$359.90, Yaesu # FT-208R \$229.90, FT-757GX \$749.90, FT-208R \$229.90, FRG-7700 \$379.90, FRG-7 \$239.90. All major lines stocked. L.T.O. Mention ad. Prices cash, FOB Preston. Closed Monday at 2:00. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

HENRY 6N2 amp. Best offer over \$1,200. W7YOZ, 206-823-8139.

DRAKE R4C, T4X, MS4, AC4, extra crystals. Factory reconditioned Jan. 84; 30 hours operation since. New cartons. \$495. W1RAN, 203-447-1255.

ROSS \$\$\$\$ USED July Specials: Collins 32-S1/75-S3/516F2 \$579, KWM2 \$445, KWM-380 \$1999, Drake T4XB, R4B, AC4, MS4 \$499, TR-DR7 \$769, Icom IC-25A \$219, IC-245SS \$239, IC-215 \$99, IC-502 \$129.90, IC-740 \$799, Kenwood TS-120S \$399.90, TS-130S \$469.90, TS-180S \$529.90, TS-520 \$429, TS-520S \$479.90, TS-800 \$399, TS-820 \$495.90, TS-920S \$565, Yaesu FR-101, FL-101 \$499.90, FT-620B \$259, CPU-2500 \$187, FT-310D \$329. If this month's special is not what you are looking for send Call letters name & phone #. Over 6,000 ham related items in stock. Mention ad. Prices cash, FOB Preston. Closed Monday at 2:00. Ross Distributing Company, 78 South State, Preston, ID 83263 208-852-0830.

DRAKE RV-7 \$75, Omni-C, 3 filters, \$575, Johnson KW Matchbox/SWR \$125. All excellent condition. K8CV, 1-313-549-1846.

MINT COND: Microwave Module 144/28 with ARR GaAsFET installed, \$165. DD1K Digital Display (for TS-520) and TS-520 Service Manual. \$80. National NCXA P.S. \$45. Call John, KCSGB, 713-376-1816 or Callbook address.

AMERITRON AL-30 linear amp, for sale. Less than 3 hrs use. \$450. N2CPU - 201-876-4754.

TEKTRONIX 545B/A1 \$275. Motorola S-1329A FM Signal Generator \$325. Heath IB-2 Impedance Bridge \$25. Marconi TF-1066 10-470 MHz AM-FM Signal Generator \$225. 40 watt MOTRAC with blander on 52.525 \$100. Sound Concepts IR-2200 Stereo Image Expander \$75. K9MM, 312-255-5666.

YAESU FT-107M/DMS transceiver, 160-10 meters w/WARC, internal AC supply, FV-107 remote VFO, CW filter, 12 tunable memories - excellent condition, \$795 (incl. UPS). Jeff Ross, Box 138, Sergeantville, NJ 08557, 609-397-3255.

SELL: Kenwood 520S, mint. \$400, KB8JV, 517-631-5479.

WANTED: Tower, HF beam, TS520 & TS430S service manuals. Call John NSGHA, 817-547-5145.

WANTED, Military Surplus radios, we need Collins 618T, ARC-72, ARC-94, ARC-102, RT-712/ARC-105, ARC-114, ARC-115, ARC-116, RT-823/ARC-131, or FM-622, RT-857/ARC-134 or Willcox 807A, ARC-159, RT-1167 or RT-1168/ARC-164, RT-1299/ARC-186, RT-859/APX-72, APX-78, ARN-82, ARN-84, ARN-89, APN-163, APN-155, APN-171, MRC-95, 718F-1/2, HF-105, Collins antenna couplers 490T-1, 490T-2, 490T-8, CU-165B/ARC, CU-1689/GRC, 490B-1, CU-1239/ARC-105, 490B-1. Top dollar paid or trade for new Amateur gear. Write or phone Bill Slep, 704-524-7519. Slep Electronics Company, Highway 441, Otto, NC 28763.

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TEN-TEC ARGOSY, 220 SSB filter, CW filter, calibrator, noise blander, DC circuit breaker, manual. Mint. \$425. WB7VOO, 602-298-4820.

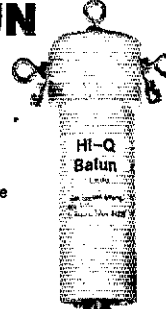
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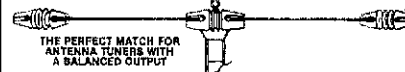
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ICOM 220MHz

IC-37A Mobile / IC-3AT Handheld

ICOM is proud to be the first manufacturer to introduce a 220MHz mobile radio with a built-in PL tone feature. The IC-37A is the only mobile radio with this feature. The IC-37A is the only mobile radio with this feature.

The IC-37A is the only mobile radio with this feature. The IC-37A is the only mobile radio with this feature.

The IC-37A is the only mobile radio with this feature. The IC-37A is the only mobile radio with this feature.

The IC-37A is the only mobile radio with this feature. The IC-37A is the only mobile radio with this feature.



Selecting PL Tone

The IC-37A comes complete with 32 PL frequencies installed. Each PL frequency is selected by turning the

PL tone selector knob. The IC-37A is the only mobile radio with this feature. The IC-37A is the only mobile radio with this feature.

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Handheld Accessories

The IC-3AT is the only handheld radio with this feature. The IC-3AT is the only handheld radio with this feature.



IC-3AT
220MHz Handheld
3 Watts



IC-37A
220MHz Mobile
25 Watts
Compact Size
Internal Speaker

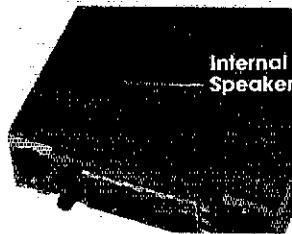
Also Available: IC-27A and IC-27H 2 Meter Mobiles and the IC-47A 440MHz 25 Watt Mobile.
Other Handhelds Available Include: The IC-2AT, IC-02AT for 2 Meters; IC-4AT and IC-04AT for 440MHz.



ICOM IC-27H

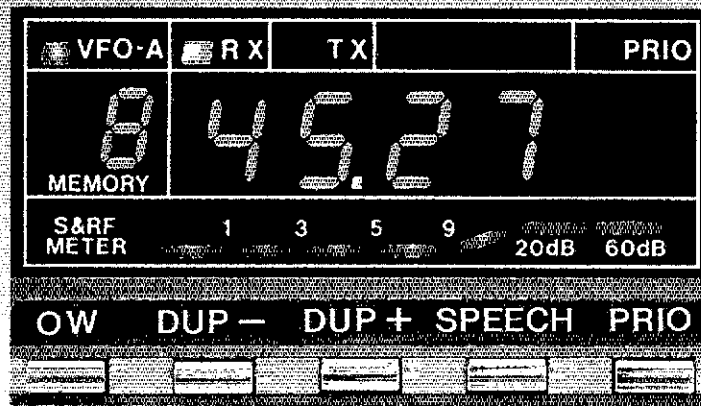
Ultra Compact 45 Watt, 2-Meter Mobile!

Now ICOM offers the best choices in compact 2-meter FM mobiles... the IC-27H 45-watt compact (1 1/8" H x 5 1/2" W x 9 3/4" D) and the IC-27A 25-watt super compact mobile. The IC-27A and IC-27H are the smallest full-featured 2-meter mobile transceivers available, and feature an internal speaker for easy installation. For the ultimate portability, the IC-37A 220MHz and IC-47A 440MHz 25 watt compact mobiles are also available.



Internal Speaker

45 Watts. The IC-27H provides 45 watts of output power, while the IC-27A provides 25 watts of output power.



32 PL Frequencies. The IC-27A and IC-27H come complete with 32 PL frequencies ready to go and are controlled from the front panel knob. Each PL frequency may be selected by the main tuning knob and stored into memory for easy access along with frequency and offset.

9 Memories. The IC-27A and IC-27H have nine memories avail-

able to store receive frequency, transmit offset, offset direction, and PL tone. Memories are backed up by a lithium backup battery, which will store memories for up to seven years.

Speech Synthesizer. As an added plus, the IC-27A/H features an optional speech synthesizer to verbally announce the receiver frequency of the transceiver through the simple touch of a button.

Scanning. Included with the IC-27A/H is a scanning system which allows scanning of the entire band.

Priority Scan. Priority may be selected to be either a memory channel or a VFO channel. By using sampling techniques, the operator can determine if a frequency of interest is free or busy.

See the IC-27A/H compact mobile transceivers at your local ICOM dealer. For superb performance, reliability, and the ultimate in a VHF mobile radio, your only choice is an ICOM.



The IC-25A 2-meter 25-watt mobile and its 45-watt companion, the IC-25H, are also available.



IC-HM23 Scanning mic with DTMF pad

IC-27H
45 Watts
1 1/8" H x 5 1/2" W x 9 3/4" D



IC-27A
25 Watts
1 1/8" H x 5 1/2" W x 7" D

Also Available: IC-37A 220MHz and IC-47A 440MHz Compact Mobiles



The World System

**NOW IS THE TIME TO
BUY A BEAM ANTENNA.
UNBELIEVABLY
LOW PRICES ON
TRIBAND BEAMS.**

**Let Uncle Sam help pay for
your beam!**

The Western Penetrator has been a favorite of DX operators in Europe for a long time. But it was never sold in the U.S. because it was too expensive. Quality costs money!

But, in the past two years, Uncle Sam has sent the U.S. dollar skyrocketing. It buys very much more overseas than ever before.

So, Palomar can buy these expensive antennas at an unbelievably low price and is passing the savings on to you. How long will the dollar stay high? No one knows. Get your beam now while the price is low. Only \$219 for a top quality 3-element tribander.

Compare price and you'll see!

Act now!

Call or write Palomar today and order your Western Penetrator. Western Penetrator - The world's best beam and now available in the U.S. at low cost.

Model DX-33 has 3 elements and a 14' boom. Price \$219 plus shipping.

Model DX-34 has 4 elements and a 20' boom. Price \$299 plus shipping.



Send for FREE catalog describing the Western Penetrator and our complete line of Noise Bridges, SWR meters, Preamplifiers, Baluns, Computer Interfaces, VLF Equipment and more.

PALOMAR ENGINEERS
1924-F West Mission Road
Escondido, California 92025
Phone: (619) 747-3343

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ANTENNA/TOWER SALE!

hy-gain

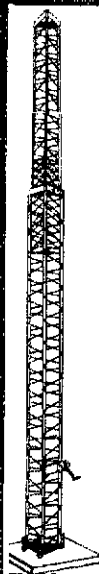
CRANKUP SALE!

All Models Shipped
Factory Direct—
Freight Paid*!

- Check these features:
- All steel construction
 - Hot dip galvanized after fabrication
 - Complete with base and rotor plate
 - Totally self-supporting—no guys needed

Model	Height	Load	Safe Price
HG37SS	37 ft.	9 sq. ft.	\$ 987
HG52SS	52 ft.	9 sq. ft.	\$ 958
HG54HD	54 ft.	16 sq. ft.	\$1498
HG70HD	70 ft.	16 sq. ft.	\$2398

Masts—Thrust Bearings—
Other Accessories Available
—Call! Prices Shown Are
Your Total Delivered Price
In Continental U.S.A.!



ROHN Self Supporting Towers On SALE!

FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save \$
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	\$319
HBX48	48 ft	10 sq ft	303	\$399
HBX56	56 ft	10 sq ft	385	\$489
HDBX40	40 ft	18 sq ft	281	\$379
HDBX48	48 ft	18 sq ft	363	\$469

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.



Tri-Ex

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

- Check these features:
- All steel construction
 - Hot dip galvanized after fabrication
 - Complete with base and rotor plate
 - Totally self-supporting—no guys needed

Model	Height Up	Down	Wind Load	List	Safe
W36	36 0 ft	20.5 ft	9.0 sq ft	\$694	\$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	\$1154	\$999
LM354	54.0 ft	21.0 ft	16 sq ft	\$2010	\$1599
LM470D	70 0 ft	22.0 ft	16 sq ft	\$4195	\$2999
(Motorized) DX86	86.0 ft	23.0 ft	25 sq ft	\$7200	Call
(Motorized)					



BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES...
- New Model HF6V \$129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) \$49.00.
- Model RMK-11 (roof mount kit with multiband radial kit \$39.00.
- Model STR-2 (Stub Tuned Radial Kit) \$29.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

RG-213U \$29/ft \$279/1000ft

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X \$19/ft \$179/1000ft

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket • Foam Dielectric

Coaxial Cable Loss Characteristics (dB/100 ft)

Cable Type	Imped.	10MHz	30MHz	50MHz	100MHz	450MHz
RG-213/U	50	6	9	2.3	5.2	
RG8X	52	8	1.2	3.5	6.8	
RG-58/U	52	1.4	1.9	6.0	12.5	
1/2" Alum	50	3	5	1.2	2.2	
1/2" Hellax	50	2	4	9	1.6	
1/2" Hellax	50	1	2	5	9	

HARDLINE/HELLAX™

- Lowest Loss for VHF/UHF!
- 1/2" Alum. w/poly Jacket... \$79/ft
- 1/4" LDF4-50 Andrew Hellax™... \$1.69/ft
- 1/4" LDF5-50 Andrew Hellax™... \$3.99/ft

HARDLINE & HELIX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
1/2" Alum	\$19	\$19	\$19	\$25
1/4" Hellax™	\$22	\$22	\$22	\$22
1/4" Hellax™	\$49	\$49	\$49	\$49

AMPHENOL CONNECTORS

- Silver PL259... \$1.25
- UG23D N Female... \$2.95
- UG21B N Male... \$2.95

ANTENNA WIRE & ACCESSORIES

- 12 Ga. Copperweld... \$12/ft
- 14 Ga. Copperweld... \$10/ft
- 14 Ga. Stranded... \$10/ft
- 18 Ga. Copperweld... \$13/ft
- 450 Ohm H.D. Line... \$16/ft
- H.D. End Insulators... \$2/ea
- Van Gorden 1:1 Balun... \$11
- Van Gorden Center Insulator... \$6

HUSTLER

- 6BTV 80-10 mtr Vert... \$109
- 4BTV 40-10 mtr Vert... \$89
- 5BTV 80-10 mtr Vert... \$129
- 6G-144B 2-mtr Base... \$89
- G7-144 2-mtr Base... \$119

Mobile Resonators

Model	10m	15m	20m	40m	75m
400W Standard	\$12	\$12	\$15	\$18	\$22
2KW Super	\$18	\$20	\$22	\$26	\$36

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

MULTI-BAND HF ANTENNAS

- A3 3-el Tribander... \$219
- A4 4-el Tribander... \$289
- RF 20/15/10mtr Vert... \$279
- A743/A744 40mtr Kit... \$75

HF MONO-BAND ANTENNAS

10-3CD	\$ 95	10-4CD	\$109
15-3CD	\$119	15-4CD	\$129
20-3CD	\$199	20-4CD	\$279
40-2CD	\$289	040	\$149

VHF/UHF BEAMS

A50-5	\$ 79	617B	\$199
214B	\$ 79	3219	\$ 95
220B	\$ 95	424B	\$ 79

OSCAR/TWIST ANTENNAS

A144-10T	\$ 52	A144-20T	\$ 75
A147-20T	\$ 63	416TB	\$ 59
A14TMB	\$ 29	PS4	\$ 69

VHF/UHF FM ANTENNAS

A147-4	\$ 29	A147-11	\$ 49
214FB	\$ 79	228FB	\$219
A449-6	\$ 29	ARX2B	\$ 39

HY-GAIN

Explorer-14, In Stock—\$289

- OK710 30/40 mtr. Add-On-Kit... \$79.00
- V2S 2-mtr Base Vertical... \$39
- TH5MK2S Broad Band 5-el Triband Beam... \$389
- TH7DXS 7-el Triband Beam... \$439
- TH3JRS 3-el Triband Beam... \$179
- TH2MK3S 2-el Triband Beam... \$159
- HY-QUAD 2-el Triband Quad... \$299
- 402BAS 2-el 40-mtr Beam... \$219
- 205BAS 5-el 20-mtr Beam... \$329
- 155BAS 5-el 15-mtr Beam... \$189
- 105BAS 5-el 10-mtr Beam... \$129
- 204BAS 4-el 20-mtr Beam... \$249
- 203BAS 3-el 20-mtr Beam... \$149
- 153BAS 3-el 15-mtr Beam... \$89
- 103BAS 3-el 10-mtr Beam... \$69
- DB105BAS 3-el 10/15 mtr Beam... \$179
- 648S 4-el 6-mtr Beam... \$59
- 668S 6-el 6-mtr Beam... \$119
- 18HTS 80-10 mtr Hy-Tower Vertical... \$429
- LC-160 160-mtr Coil Kit for 18HTS... \$39
- 214 14-el 2-mtr Beam... \$39
- 2B0D 80/40 mtr Trap Dipole... \$59
- SB0D 80-10 mtr Trap Dipole... \$119
- BN66 80-10 mtr KW Balun W/Coax Seal... \$19

MOSLEY

- CL-333-el Triband Beam... \$279
- TA-333-el Triband Beam... \$249
- TA-33JR 3-el Triband Beam... \$189
- TA40KR 40mtr Kit for TA33... \$119



MINI-PRODUCTS HQ-1

- Wing Span - 11 ft
- Wind Area - 1.5 sq ft
- Boom - 54 in. long
- 1200W P.E.P. Input

ALPHA DELTA COMMUNICATIONS

- Transi-Trap™ Surge Protectors—In Stock Now!
- Model LT 200W UHF Type... \$19
- Model HT 2KW UHF Type... \$29
- Model LT/N 200W N Type... \$39
- Model HT/N 2KW N Type... \$44
- Model R-T 200W Deluxe... \$29
- Model HV 2KW Deluxe... \$32

KLM

- KT34A 4-el Broad Band Triband Beam... \$339
- KT34XA 6-el Broad Band Triband Beam... \$489
- 80M-1 80-mtr Rotatable Dipole... \$469
- 40M-1 40-mtr Rotatable Dipole... \$179
- 40M-2 2-el 40-mtr Beam... \$309
- 40M-3 3-el 40-mtr Beam... \$439
- 40M-4 4-el 40-mtr Beam... \$649
- 20M-6 6-el 20-mtr Beam... \$689
- 15M-6 6-el 15-mtr Beam... \$439
- 10M-6 6-el 10-mtr Beam... \$259
- 10-3D-7LPA Log Periodic Beam... \$639
- 2m-13LBA 13-el 2-mtr Beam... \$79
- 2m-14C 14-el 2-mtr Satellite Antenna... \$89
- 435-18C 435 MHz Satellite Antenna... \$65
- 432-16L 16-el 432 MHz Beam... \$69

ROTORS & CABLES

- Alliance HD73 (10.7 sq ft rating)... \$109
- Alliance U100 (for small beams & elevation)... \$49
- Telex HAM 4 (15 sq ft rating)... \$199
- Telex Talktwister (20 sq ft rating)... \$249
- Telex HDR300 Heavy Duty (25 sq ft rating)... \$479
- Kenpro KR-500 Heavy duty elevation rotor... \$189.00
- Standard 8 cond cable \$19/ft (vinyl jacket 2-#18 & 6-#22 ga)
- Heavy Duty 8 Cond cable \$36/ft (vinyl jacket 2-#16 & 6-#18 ga)

SOUTH RIVER ROOF TRIPODS

- HDT-3 3 ft Tripod... \$19
- HDT-5 5 ft Tripod... \$29
- HDT-10 10 ft Tripod... \$49
- HDT-15 15 ft Tripod... \$69

ROHN GUYED TOWERS

- 10 ft Stack Sections
- 20G \$37.50
- 25G \$46.50
- 45G \$107.50
- 55G \$127.50
- All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers

Model	Height	Ant Load*	Price
FK254B	48 ft	15.4 sq ft	\$ 829
FK255B	58 ft	13.3 sq ft	\$ 899
FK258B	68 ft	11.7 sq ft	\$ 959
FK4544	44 ft	34.8 sq ft	\$1159
FK4554	54 ft	29.1 sq ft	\$1259
FK4564	64 ft	28.4 sq ft	\$1359
25G Foldover Double Guy Kit			\$199
45G Foldover Double Guy Kit			\$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

TOWER/GUY HARDWARE

- 3/16" EHS Guywire (3990 lb rating)... \$13/ft
- 1/4" EHS Guywire (6000 lb rating)... \$16/ft
- 5/32" 7 x 7 Alrcrat Cable (2700 lb rating)... \$12/ft
- 3/16" CCM Cable Clamp (3/16" or 5/32" Cable)... \$35
- 1/4" CCM Cable Clamp (1/4" Cable)... \$45
- 1/4" TH Thimble (fits all sizes)... \$30
- 3/8"EE 13/8" Eye & Eye Turnbuckle... \$5.95
- 3/8"EE 3/8" Eye & Jaw Turnbuckle... \$6.95
- 1/2"EE 1/2" Eye & Eye Turnbuckle... \$8.95
- 1/2"EE 1/2" Eye & Jaw Turnbuckle... \$9.95
- 3/16" Preformed Guy Grip... \$1.99
- 1/4" Preformed Guy Grip... \$2.49
- 6" Diam - 4 ft Long Earth Screw Anchor... \$12.95
- 5000 Guy Insulator (5/32" or 3/16" Cable)... \$1.39
- 502 Guy Insulator (1/4" Cable)... \$2.49
- 5/8" Diam - 8 ft Copper Clad Ground Rod... \$12.95

PHILLYSTRAN GUY CABLE

- HPT62100 Guy Cable (2100 lb rating)... \$29/ft
- HPT64000 Guy Cable (4000 lb rating)... \$43/ft
- HPT66700 Guy Cable (6700 lb rating)... \$69/ft
- 9901LD Cable End (for 2100/4000 cable)... \$6.95
- 9902LD Cable End (for 6700 cable)... \$7.95
- Sockeafast Potting Compound (does 6-8 ends)... \$12.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	6 FT	10 FT	16 FT	20 FT
12 in Wall	\$25	\$39	\$59	\$79
18 in Wall	\$39	\$69	\$99	\$109
25 in Wall	\$69	\$129	\$189	\$249

TEXAS TOWERS

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Telephone
(214) 422-7306

Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm



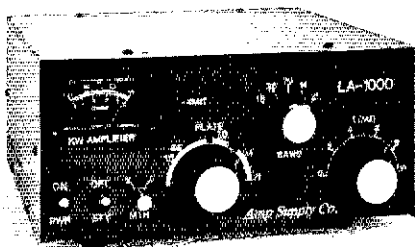
SUPER PRODUCTS + SUPER WARRANTY

SATISFACTION
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SATISFACTION

As founder and president of Amp Supply Co., I guarantee you'll be satisfied with our fabulous amateur radio products. I will only manufacture products I personally would use on the air. All Amp Supply Products now carry a full 2 years warranty against manufacturing defects or parts failure. (tubes are warranted by the original manufacturer) If you are dissatisfied write to me and I'll refund or replace your product within 10 days of purchase from Amp Supply Co. We want you to enjoy Ham Radio with Amp Supply Products.

"TURBO CHARGE YOUR STATION WITH AMP SUPPLY" 73 DENNY K8KXK

LA-1000A 1200 WATT AMPLIFIER



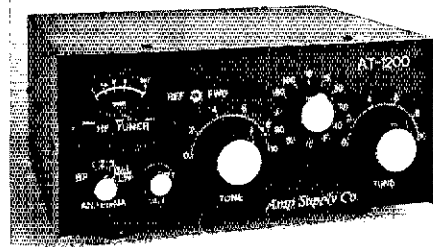
LA-1000A

The LA-1000A is a portable kilowatt now covering 160-15 meters. Typical drive requirement is 100 watts PEP yielding 1200 watts PEP SSB 800 watts CW. The compact linear uses four 6MJ6 tubes, has a tuned input and QSK built in and comes in an attractive gray-on-gray finish.

This is a super linear for all purposes, the LA-1000 excelled during the Heard Island DX pedition with over 30,000 contacts. The rugged design lends itself to continual use during contests and users are even running it on RTTY at 500 watts input.

LA-1000A \$449.50*

AT-1200 TUNER



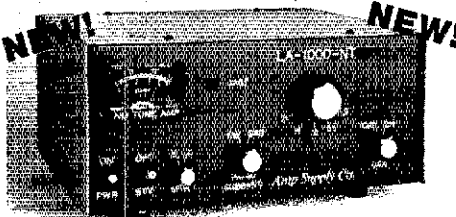
AT-1200

The AT-1200 antenna tuner is the perfect companion for the LA-1000A or any amplifier running up to 1200 watts input. It covers 1.8 to 30 MHz, has an antenna selector switch for 3 coax positions and 1 long wire or balanced feedline, and a built in SWR bridge and meter.

AT-1200 \$189.50*

BL-1500 9:1 5 KW Balun \$29.50*

THE NEW NO TUNE — LA-1000-NT



More contacts, eliminate tune-up time, and less tune-up interference are yours with the NEW LA-1000-NT. The NO TUNE LA-1000 offers full coverage of the 160-15 meter amateur bands. A powerful 1200 watts PEP input and 800 watt DC input is the power rating of the LA-1000-NT. As with all Amp Supply Amplifiers, the NO TUNE LA-1000 features QSK, full break-in CW. Computerized CW and Keyboard Operators will love conversation-like full break-in (QSK) CW. If you desire a compact kilowatt amplifier that needs no tuning and you have a transceiver capable of delivering 100 watts PEP—The LA-1000-NT is the perfect addition to your radio station!!

LA-1000NT No Tuneup \$529.50*



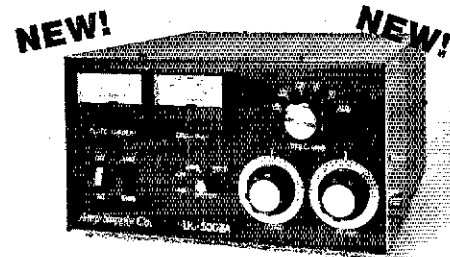
AIM-1™ Major Antenna break through!

The AIM-1 is an antenna impedance matching network for random, long wire or loop antennas. It provides continuous coverage from 500 KHz - 30 MHz, is completely automatic, no knobs to turn or coils to tap. Installation is simple: hook on wire antenna, ground, coax cable to station and balancing module at opposite end of wire. The antenna is ready for transmission from 1.8 - 30 MHz at up to 3KW PEP.

- SWR max 2:1, 1.5:1 average
- wire lengths should be 1/2 wave on lowest frequency for maximum efficiency.
- inverted V, inverted L, rombic, random wire or loop antennas
- weatherproof
- 2 year warranty

AIM-1 \$139.50*
with 130' antenna wire and insulators \$149.50*
Stranded Ant. Wire \$.08 ft.

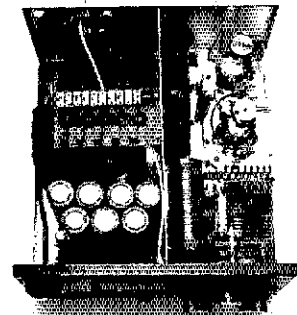
LK500ZA 2.5 KW AMPLIFIER



The all new Amp Supply LK-500ZA 2.5 KW Input Amplifier is the right amplifier, with the right features at the right price. The LK-500ZA comes completely assembled and covers 160-15 meters. Two Eimac 3-500Z triodes in grounded grid are featured with a dual cooling system, one for the power supply and the other cooling the 3-500's. There's only one 2.5 KW amplifier with a pair of 3-500Z tubes in the world that sells for under \$900.00.

The Amp Supply LK-500Z!

- 2.5 KW SSB PEP Input: 1500 Output
- 1.5 KW Input CW :900 Output
- 1 KW SSTV, RTTY Input: 600 Output
- QSK Full Break-in CW
- 9" H x 15" W x 15" D
- 117/234 AC 50/60 Hz
- New Improved Bridge Power Supply with Computer Grade Electrolytics
- 1500 Watt Output with Hipersil Transformer



Interior view of LK-500ZA with "Peter Dahl" Hipersil Transformer

LK-500ZA

Wired and Tested \$889.00
1500 Watt Output
All Made with Hipersil Transformer . \$1099.50

SAS-1 Sloper Antenna System 30, 40, 80, 160 Meters	\$ 99.50*
AEX-1 33' Self-supporting Vertical Antenna	\$ 89.50*
APC-1 Phasing Control System for verticals or dipoles	\$109.50*
A-132-S Shielded Balanced feed line 5 KW PEP	\$.24 per foot

*POSTPAID CONTINENTAL USA.

COMPLETE PARTS INVENTORY—INCLUDING PARTS FOR ANY AMPLIFIER OR TUNER—SEND FOR A CATALOG TODAY.

Amp Supply Co.

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THE NEW WORLD OF HAM RADIO



Tired of paying too much for your Ham gear? The new generation of Yaesu high-technology equipment is designed with you in mind! New advances in computer-aided design and robotics manufacture help you save money while being assured of the best... from Yaesu!

FT-757GX Line Affordable Excellence

GENERAL COVERAGE

Continuous coverage on RX from 500 kHz to 29.99 MHz in 10 Hz steps, with easy modification for MARS TX outside the Ham bands. WARC bands factory installed.

ACCESSORIES FACTORY PACKED

Electronic keyer, 600 Hz CW filter, speech processor, AM and FM units, all-mode squelch, Woodpecker noise blanker, and receiver preamp... all included in the base price, not expensive options!

FULL PERFORMANCE

Full CW QSK full 100 watts output at 100% duty cycle (SSB, CW, FM), and full microprocessor control with dual VFOs, eight memories with bilateral memory, VFO swap, and personal computer (CAI System) compatibility make the FT-757GX a winner, at home or away.

FT-757GX ACCESSORIES

FP-757GX Switching Power Supply, FP-757HD Heavy Duty Power Supply (for 100% duty cycle operation), FC-757AI Automatic Antenna Tuner with Memory, FAS-1 4R Remote Antenna Selector, SP-102 Speaker with Audio Filters, MD-1B8 Desk Mic, MH-1B8 Hand Mic, FIF-232C Computer Interface Module.

FT-203R Line The Compact Companion

ULTRA-COMPACT DESIGN

Chip components installed by Yaesu's assembly robots significantly reduce circuit board size, resulting in a rugged, reliable transceiver with a weight of only 450g, including the standard FNB-3 battery.

HANDS-FREE VOX

A VOX (voice-actuated transmit) unit is built-in, allowing hands-free operation when the optional YH-2 Headset is used. Ideal for tower work, public safety, or other applications where manual PTT control is inadvisable. Level control provided.

FULL FLEXIBILITY

Built-in 5-meter, thumbwheel frequency programming. Hi, LOW power switch, busy channel and transmit indicators are standard. DIMF Encoder versions, as well as 220 MHz and 440 MHz lines, are coming soon!

FT-203R ACCESSORIES

FIS-7 CTCSS Module, FBA-5 AA Cell Case, YH-2 Headset, MH-12 Speaker Mic, FNB-4 High-Capacity Battery, PA-3 Mobile Adapter, MMB-21 Mobile Hanger, NC-15 Quick Charger, AC Adapter, FIT-3 DIMF Keypad.

The time you're in the market for a better rig, ask about Yaesu. Dealers with core and built with pride - your request will get you in touch!

Wide range of modifications, subject to change without notice or obligation.



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KENWOOD

Kenwood is a leader in amateur radio.

TS-830S

TS-830S... a "top notch" field proven performer.

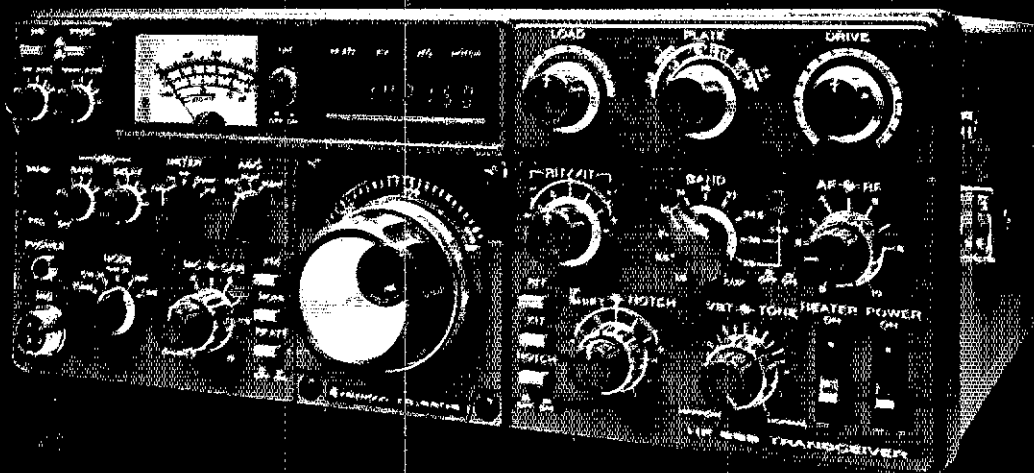
The TS-830S is the HF transceiver that delivers the performance the others can only talk about.

Kenwood's TS-830S offers you every conceivable operating feature built in for 160-10 meters, including the WARC bands. Key operating features

- 100-watt tube power amplifier
- 50-watt variable Zener diode limiter
- 50-watt automatic noise reduction
- 50-watt automatic noise blanker
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TS-530SP

TS-530SP... "Game-changer" in performance and value.

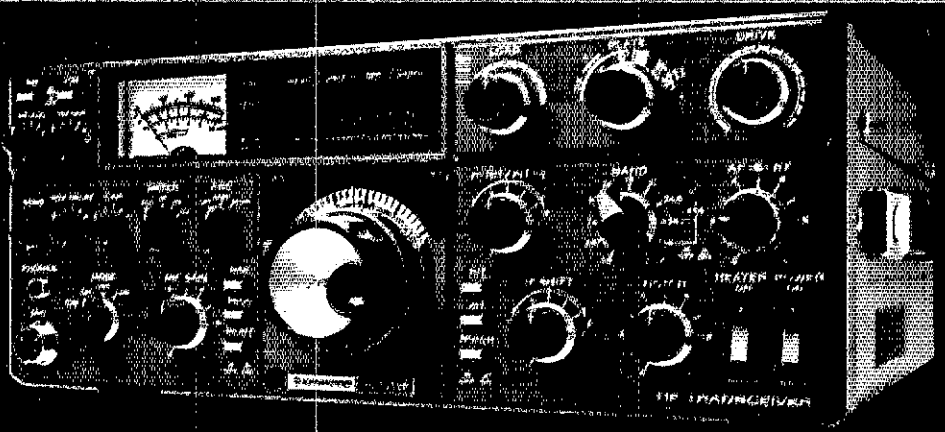
No other HF transceiver gives you all these features at such an affordable price.

The TS-530SP covers 160-10 meters, LSB, USB, CW, including WARC bands and it also receives WWV on 10 MHz. When you want to use TS-530SP, the IF shift tones

- 100-watt automatic noise blanker
- 50-watt automatic noise blanker
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Specifications and prices are subject to change without notice by Kenwood.

More information on the TS-830S and TS-530SP is available from authorized dealers or Kenwood Communications, 111 West Main Street, Compton, California 90220.